DOCUMENT RESUME

ED 217 149 CE 032 125

AUTHOR Huddleston, Kenneth F.
TITLE The Efforts of Business to Improve Human Productivity and Quality of Work Life: Training Implications for Community/and Technical Colleges.
INSTITUTION Ohio State Univ., Columbus. National Center for Research in Vocational Education.
PUB DATE Jun 82
NOTE 137p.

EDRS PRICE MF01/PC06 Plus Postage.
DESCRIPTORS Adult Vocational Education; *Community Colleges; *Educational Needs; Education Work Relationship; Human Capital; Job Training; Labor Force Development; *Productivity; Program Development; Quality of Life; *Retraining; *School Business Relationship; *Technical Institutes; Two Year Colleges

ABSTRACT

Productivity is a major issue in every discussion about the national economy. There is growing evidence that lagging productivity is one of the roots of the national economic slowdown, manifested in high rates of inflation and unemployment, increased federal deficits, and in reduced ability to compete in international markets. Many economists believe that the United States needs a new framework for economic understanding in order to bring back productivity. The economists recommended investment in both human and technological capital. Community and technical colleges have vital roles to play in developing human resources; they are the only existing system for delivering much of the needed training to working adults. It will be essential for colleges to establish closer collaboration with business and industry, to support fast-response training programs, and continually to assess the needs of the business and industries of their areas. It will be crucial for the decision makers of the community and technical colleges to understand the training needs and the emerging management practices that are being used by business and industry to improve productivity and the quality of work life. Two of these practices are job retraining and employee participation, and both could require training that could be delivered through collaboration between business, industry, and community and technical colleges. (The paper identifies the emerging training needs that will be crucial in the years to come and provides practical suggestions for strengthening community college-business ties.) (KC)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED217149

THE EFFORTS OF BUSINESS TO IMPROVE HUMAN PRODUCTIVITY AND QUALITY OF WORK LIFE: TRAINING IMPLICATIONS FOR COMMUNITY/AND TECHNICAL COLLEGES

by
Kenneth F. Huddleston
National Fellow, Advanced Study Center

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

✓ This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Kenneth F. Huddleston

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

CE 032 125

The National Center for Research in Vocational Education
The Ohio State University
1960 Kenny Road
Columbus, OH 43210

Cooperating Partners
American Association of Community and Junior Colleges, Washington, D.C.
American Society for Training and Development, Washington, D.C.
American Vocational Association, Arlington, Virginia

June 1982

This writing is dedicated to the women in my life:

my mother, Pauline Huddleston
my mother-in-law, June Thierbach
my wife, Kay
and my daughter, Cheryl Lynn

TABLE OF CONTENTS

	Page
LIST OF FIGURES	v
FOREWORD	vii
EXECUTIVE SUMMARY	ix
INTRODUCTION	1
WHY A NEW DIRECTION FOR OCCUPATIONAL EDUCATION?	3
Catching a New Vision	4
Economic Problems and Lagging Productivity-- A Key Interrelationship	8
What We Need to Know about Productivity	18
What We Need to Know about Economics	34
Human Capital Investment-- A Significant Part of the Answer	41
Reindustrialization	51
PARTNERSHIP POSSIBILITIES IN HUMAN RESOURCE DEVELOPMENT	54
What Critical Management Practices Are Being Used	63
Delivering Training for Job Redesign	72
Training Needs for Job Redesign	80
Employee Participation Training Needs	86
What Must the Schools Do to Work Cooperatively with Business and Industry	103
Barriers to Closer Cooperation	109
Stragegies to Build Partnerships	110
REFERENCES	
RESOURCE LIST	
APPENDIX A. NATIONAL COMMITTEE	
APPENDIX B. NATIONAL TELEPHONE REACTORS	

LIST OF FIGURES

		Page
1.	Output per Hour of All Persons Employed in Private Business Sector	24
2.	Rates of Growth in Labor Productivity	26
3.	Projected International Productivity Trends, 1978-1990, for Six Nations Leading in National Productivity Levels	27

FOREWORD

The challenges of lagging productivity and economic slowdown continue to plague our nation. Many believe that productivity and economic improvements of a substantial degree will require massive human capital investment. This manuscript will help the reader understand the important interrelationships among lagging productivity, economic slowdown, and human capital investment. The paper identifies what business and industry is doing to improve human productivity and the quality of work life. It examines what upgrading and retraining needs are developing for the existing work force and how postsecondary occupational education can collaborate more closely with the business/industry community in meeting those needs.

The National Center is pleased to present this paper by Dr. Kenneth F. Huddleston, who wrote it while serving as a National Fellow in the Advanced Study Center of the National Center for Research in Vocational Education. Dr. Huddleston was on leave from Fox Valley Technical Institute, Appleton, Wisconsin. This work represents a unique effort that utilized the assistance of the following cooperating partners: the American Association of Community and Junior Colleges, the American Soceity for Training and Development, and the American Vocational Association. The final writing represents the opinions and conclusions of the author, and does not necessarily of the associations, or of the individuals who assisted with portions of the study of the National Center for Research in Vocational Education.

This paper would not have been possible without the assistance of a wide range of individuals, who consented to

interviews, provided study tours of plants and schools, and offered counsel. Special appreciation is extended to Dr. Gene Bottoms, American Vocational Association; Robert Craig, American Society for Training and Development; and Dr. Richard Wilson, American Association of Community and Junior Colleges. Members of the National Committee and National Telephone Reactors (listed in the back) and other resource persons provided timely insights.

Professional staff members of the National Center who provided continuous help were Drs. Cathy Ashmore, Arthur Lee, James Watkins and Ms. Catharine Warmbrod. Additional valuable support was provided by Kathy Friend and Cindy Cheeley, typists, and by Janet Kiplinger editor.

Robert E. Taylor
Executive Director
The National Center for Research
in Vocational Education

EXECUTIVE SUMMARY

This concept paper is designed for community and technical college presidents, deans of instruction, practitioners, and other decision makers in postsecondary education. The paper has two broad goals. The first is to give you a rationale for closer cooperation between postsecondary occupational education and business and industry. The rationale is based on the dynamic interrelationships among our lagging national productivity, our economic slowdown, and human capital investment. This last element--the concept that improving human productivity, the national economy, and the quality of work life for Americans depends strongly on how much investment is made in developing human resources--is a major focus of the paper.

The second goal of the paper is to describe how you, as decision makers in a community or technical college, can work more closely and effectively with business and industry to improve the development of these vital human resources. The paper clearly identifies the kinds of emerging training needs that you need to address--in cooperation with business and industry--to help develop the potential of the existing adult work force in this country. The paper will provide you with practical suggestions for strengthening your collaborative ties with business and industry.

Some of the specific questions addressed here include the following:

- What are the causes, scope, and challenges of lagging productivity? How does lagging productivity show itself in the national economy and the stability of the country?

How does occupational education and training (human capital investment) help improve productivity and affect the stability of the economy and the nation? What are the relationships between the sluggish national economy and human capital investment (i.e., public occupational education and private sector training)? Why is it critical to understand these relationships? What does reindustrialization mean for you, especially concerning your college's involvement in retraining the existing work force?

- What is business and industry doing to meet the challenge of improving human productivity and the quality of work life?
- What new management practices is business and industry using to improve human productivity and the quality of work life, and how can postsecondary colleges assist in providing training to make the management practices work? What specific training do employees, supervisors, and lower level mid-management personnel need to implement and maintain the new management practices?
- How can you, as decision makers in postsecondary education, work cooperatively with business and industry to train or retrain personnel to use the new management practices? What administrative and content strategies will you need, and what barriers could make it difficult for you to implement the strategies at the local level? How can you overcome these barriers?

The paper will also explain why productivity is a major issue in every discussion about the national economy. One problem

with productivity is that a lot more is said about it than seems actually to be known about it. There is growing evidence, however, that lagging productivity is one of the roots of the national economic slowdown, manifested in high rates of inflation and unemployment, in our slipping standard of living, in our increased federal deficit, and in our reduced ability to compete in international markets. Continued lagging productivity has been called "the most basic sickness of the U.S. economy" (Skibbins 1981).

Many economists now agree that our economic slowdown will not be remedied simply by traditional monetary and fiscal controls. Instead, they believe that the foundation (or infrastructure) of America's economic system has weakened and needs to be shored up. They believe the country needs a new framework for economic understanding that will emphasize the importance of improving productivity in order to shore up that infrastructure and bring back economic stability.

What the economists are recommending always comes back to the need to improve both the human and technological capital of the private sector. The need for business and industry to invest in human beings as major resources is critical in this formula, and may ultimately prove more important to economic recovery than technological investments.

What becomes clear in all this is that community and technical colleges have vital roles in helping this country develop its human resources. If the United States is to embark on a massive program of human resource development--involving the retraining of tens of millions of working adults--the only existing system for delivering much of the needed training is that of the community and technical colleges. It will be

essential for your college to establish closer collaboration with business and industry, in partnerships of a breadth and depth not yet envisioned. As decision makers in public occupational education, you will need to redefine your college's mission and rethink its strategies, especially in addressing training for work beyond initial job entry. You will need to create new administrative procedures and new content development stragegies to support "fast response" training programs and to avoid expensive and frustrating "red tape." You will need to develop and maintain ongoing needs assessments with the business and industry sector in your area. Federal, state, and local governments will need to become enabling partners in this process.

One of the most critical elements of this process will be how clearly you, the decision makers of community and technical colleges, understand the training needs of working adults and of business and industry. Of particular importance will be how well you understand the new and emerging management practices that are being used by business and industry to improve productivity and the quality of work life. Two of the most popular of these management practices are job retraining and employee participation, and each requires training that could be partially or wholly delivered through a collaborative arrangement between business and industry, and community and technical colleges. We expect these kinds of management practices to touch the lives of a great number of the workers, supervisors, and lower level mid-management personnel in the next ten years, and there is an enormous challenge in it for your college in helping to improve the productivity and quality of work life in America.

INTRODUCTION

To "catch a new vision' is to look afar, to see anew, and to envision what has not yet been dreamt. Lagging productivity in U.S. business and industry has contributed to a reindustrialization of America, giving those of us involved in human resource development in both the public and private sectors the opportunity--and challenge--of "catching a new vision." We are being called on to envision what we must do to train, retrain, and upgrade the nation's existing adult work force, and we must look for ways to do this at higher technical levels and with shorter turn-around times than ever before imagined.

This paper is intended to help all of us in human resource development--especially decision makers and practitioners in community and technical colleges--get together with business and industry in new cooperative arrangements that can help speed the retraining of America's work force. The paper--intended as an aid to understanding and to practice--is the product of an intense year-long study conducted by the National Center for Research in Vocational Education, in cooperation with the American Association for Community and Junior Colleges (AACJC), the American Soceity for Training and Development (ASTD), and the American Vocational Association (AVA).

The first major section, "Why a New Direction for Occupational Education?" discusses a rationale for increased cooperation between the private sector and public postsecondary education in order to improve the nation's productivity and quality of work life. Woven into the discussion are the intrinsic issues of lagging productivity and its causes, the current economic slowdown and

related economic theories and practices, and the need for this country to invest in human capital through retraining of the existing work force.

The second major section, "Partnership Possibilities in Human Resource Development," tackles the tough questions of what kinds of retraining and upgrading workers, supervisors, and lower level mid-management personnel will need. It discusses how community and technical colleges must and can become the primary deliverers of these vital training services, and offers practical suggestions for making the essential partnerships with business and industry work.

WHY A NEW DIRECTION FOR OCCUPATIONAL EDUCATION?

Catching A New Vision

Historically occupational education has been called upon to have an impact on the nation's economy. The 1917 Smith Hughes Act was in response to the economic welfare of the day. Following the depression, in 1936 the George Dean Act was passed for economic reasons. In 1946, the George-Barden Act responded to the needs of veterans re-entering the labor force. The economic impact of occupational education during WWII to move the country from peace time to war time and back to peace time clearly reflected the economic role of occupational education (Meyer 1977).

In studying productivity, the temptation for the reader and writer is to go directly to a delination of the training needs of B/I so that effective individual training programs can be delivered locally. However, to plunge directly into a discussion of training needs without a foundation in the concepts and interrelationships of lagging productivity, the ills of our economy of inflation, unemployment, lessening of the standard of living, and the inability of our country to compete with foreign companies, and the role of community and technical colleges is like building a house on a weak foundation--reducing it to limited usefulness. Beginning this study by first understanding the nature, causes and solutions of lagging productivity to the ills of our economy, facilitates the emergence of a more enduring, large scope mission, and a more comprehensive involvement of community and technical colleges than would otherwise be possible.

Though the economic rationale for occupational education is continued today, many feel that the past two decades have concentrated more on the social questions of the day. Important programs such as equity, access, and redistribution have received the focus of the day. During the past two decades, however, the economic function of occupational education has received little mention. Occupational education literature seldom speaks of economics. Meyer (1977) points out that economics will need to once again become a primary concern of persons in occupational education. Of interest to everyone and every institution will be the movements related to national income, production, employment, recession and depression, recovery, boom, and inflation (Bailey 1971).

It is once again time for us to examine our role in heavy economic issues of the day. We already realize that our nation is facing extreme economic difficulty and that lagging productivity is a major problem in our country. What may be difficult for us to understand is precisely how occupational education can impact on the nation's companion problems of the failing economy and lagging productivity and the interrelations that exist between economics, productivity, and occupational education (HRD). To thoroughly understand the component parts of economics, productivity, and human resource development (HRD) and their key interrelationship is for occupational education to "catch a new vision" of the 1980s and 1990s. The future of occupational education lies with an expanded vision for economic recovery (Carnevale 1982).

By clearly understanding this key interrelationship, occupational education can move itself from the role of an occasional

deliverer of in-plant training to a new role as a cornerstone to economic recovery of our nation. We can become the pivotal point in the process of training, retraining, and upgrading of the existing work force which is considered by many to be the answer to many of the economic and productivity problems we face as a nation. As the only established in-place delivery system (Hopkins 1982), vocational education can emerge as a critical intervening force in the strategy to improve U.S. productivity and stabilize our economy.

Based on this new understanding, we can develop a meaningful knowledge of why we must go in an additional direction, where we must go, and how we will get there. Armed with solid understanding of this interrelationship, decision makers of community and technical colleges can take a leadership position in establishing an expanded role for occupational education--the role of a key component part of our national economic recovery program. We can convince both business and industry (B/I) and government of the important role we have to play and develop the rationale for funding this new purpose based on national and local economic theory and practice. More importantly, we can clearly spell out the actual dollars and time savings available to the nation for utilizing the schools as a key intervening element.

The interdependencies between education and the national economy are more complex and subtle than is usually recognized. Though this calls for understanding of sophisticated economics whose limitations need to be recognized, understand we must (Thurow 1979). Our understanding of this emerging interrelationship is crucial. Without our ability to articulate

this interrelationship concept and the role of community and technical colleges, other less able institutions and agencies may be given the responsibility, resulting in a slow and costly recovery for the nation. Without this awareness, at the local level, schools will not develop the imaginative delivery systems that might have been.

Economic Problems and Lagging Productivity - A Key Interrelationship

The realization of the seriousness of lagging productivity as its impact is felt throughout the economy is ominous. The short-term economic effects of inflation, unemployment, lessening of our standard of living, and inability to compete successfully with foreign companies are noticeable by all segments of our society. Some would argue that major economic and political disruptions are likely during the next decade. Long term effects of social and political unrest, reduced national defense capabilities, and stagering economic problems caused by unchecked lagging productivity could impact drastically on the future of our nation and touch the lives of all Americans.

The social and political disruption that could be caused by continued lagging productivity, with its impact shaking every persons economy, could be over powering. Sar Levitan (1981) suggests that if the problem is left unresolved, we could experience social confrontation, race against race, and haves against have nots. The gains of the poor in terms of leisure, educational access, improved standard of living, jobs, and career mobility could be wiped out (Parrott 1981). Developed nations are realizing that without comprehensive planning to rebuild our industrial base and the accompanying planning on many fronts, continued suffering from unemployment, inflation, environmental degradation, and urban decay will not disappear (Skibbins 1981).

Lagging productivity and its weakening of the overall economic foundation of our nation have serious implications for the

national defense of this country. Simply stated, during difficult economic times, the monetary resources are simply not available to support programs of national defense and other priorities of government at a high level. Under such conditions, budget cuts in the military can be expected.

In testimony before the Industrial Preparedness Panels of the House Armed Services Committee of the House of Representatives, General Alton D. Slay, Commander Air Force Systems Command, stated that our productivity slowdown has been significantly influenced by the slowdown of investment in new technology and modern equipment. He pointed out that slowdown in investment in updating the technology and equipment of the U.S. is impacting on the military strength. The status of the U.S. defense industrial base is at a near crises. Additionally, lagging productivity caused in part by lack of investment in research and development, shortages of skilled workers, and the low quality inherent in many of our products further contribute to our declining industrial base with multiple negative implications for national defense (McKee 1981).

A significant cause of lagging productivity is the lack of advances in knowledge and education in the U.S. At a time when our nation expects to spend three times the amount on national defense as was spent in the Vietnam War in the same span of time, the current defense of our country may depend upon the availability of highly trained individuals (Carnevale 1981). Unfortunately, the need for skilled persons comes at a time when great shortages of skilled workers exists (Hopkins 1982). Compounding the problem is the projection that in 1990, the

Inflation impacts on almost all segments of society, relentlessly hurting those who have fixed incomes or relatively fixed incomes (Parrott 1981). Though not recognized by many, drops in the nation's level of productivity cause a big portion of inflation (Freund 1980). Productivity, also impacts heavily upon inflation, according to Dr. C. Jackson Grayson, chairman, American Productivity Center (Waldman 1980). Simply stated, during a period of low or zero gains in the productivity level of a work force, wage and benefit gains for the work force are made up by price increases on the goods and services produced. Nationally, the increases in prices for foods and services are paid by the consumers, who are also workers. Under these conditions, wage gains contribute to spiraling inflation because they are not based on gains in productivity. Real gains in the standard of living of the worker do not develop.

More importantly, percentage point drops in productivity have a multiplying effect on increasing inflation. For a 1 percentage point drop in productivity from a 2 to 4 percent inflation point, increases over a four-year period might be anticipated. Until recently, little attention has been paid to the impact of changing productivity rates on the pace of inflation. Unfortunately, inflation has been stereotyped by either demand-pull or cost-pushing origin and little attention has been paid to the dynamic process of productivity and inflation (Freund 1980).

Unfortunately, inflation induced by lagging productivity has a multiplier effect. The multiplier model draws from the concept of the "wage-price spiral." The concept involves wage increases one year, which are totally consumed by a corresponding

military will need one out of every three high school graduates.

New military technology such as decision-guided missiles, ultra-small electronics, antennas and electo-magnetic detection, laser technology in charged particle beams, and flight controlled signals transmitted by optical fibers, cries out for skilled designers, installers, operators, and maintenance personnel. Recently, the Navy junked its ultramodern $30 million vessel computer for a simple computer system because it lacked the trained personnel to operate the equipment. Sophisticated target tracking systems for ships, tank killing helicopters, and other systems consistently show high downtime because of the lack of trained persons to operate and care for the equipment (Wolfbein 1981).

Indeed, as technological change accelerates, our ability to strengthen the defense of the U.S. will depend on the availability of financial resources and our ability to integrate technologies with human skills (Carnevale 1981a). Prolonged effort is needed if we are to recover the ground we have lost. A miminum of a ten year effort is needed to increase productivity and shape up this situation an its impact on national security (Etizoni 1981).

Economically, since the early 1970s the combination of both the loss of our increases in productivity coupled with increased stiff competition has resulted in structural inflation, unemployment, lessening of our standard of living, and inability to compete worldwide. During this period, monetary and fiscal efforts to solve this problem have only aggrevated the situation (Carnevale 1981b). The seriousness of the impact of lagging productivity escelates each day.

inflation during the same period. As a result wages are normally bargained at a higher rate for the following year. Therefore, each year, the previous year's inflation causes labor negotiators to bargain for even higher raises, whether or not productivity reflects the justification for such a wage increase. Increased productivity in these circumstances is to cool inflation while maintaining the nation's commitment to higher level employment.

A slowdown in the productivity growth rate during one period will ignite an inflation speedup not only in that period but in succeeding periods--even after the decline in productivity growth is halted. This relationship can best be illustrated by means of an example.

Assume that in Period 1 workers anticipate no inflation because there was no inflation in the preceding year. Labor seeks a wage increase of 3 percent, solely to match the perceived long-run average increase in productivity. In other words, workers expect their real incomes to rise and their purchasing power and standard of living to improve. If productivity actually rises by 3 percent in Period 1, the year will be inflation free.

Period 1

Assumed inflation	0%
Expected growth in real income	3%
Wage increase	3%
Productivity gain	3%
Actual inflation (unit labor costs)	0%

Next, assume that productivity gains slacked in Period 2, from 3 percent to 1.5 percent--an assumption that conforms to the reality of recent years. The wage-price spiral is quickly activated.

Period 2

Assumed inflation	0%
Expected growth in real income	3%
Wage increase	3%
Productivity gain	1.5%
Actual inflation	1.5%

Workers anticipated that purchasing power would grow at the same 3 percent rate as in Period 1. But because productivity dropped off, unit labor costs went up and so did prices. Hence, inflation enters the picture at the rate of 1.5 percent. In effect, wages increase by 3 percent, half of which is consumed by inflation, leaving only a 1.5 percent increase in real income. Labor is disappointed and readies new wage demands aimed at overcoming the real-income deficit.

Predictably, in Period 3, wage demands go up to 4.5 percent. (The assumption is reinforced by the large number of labor contracts that have cost-of-living escalators built in.)

Period 3

Assumed inflation	1.5%
Expected growth in real income	3%

Wage increase	4.5%
Productivity gain	1.5%
Actual inflation (unit labor costs)	3%

Obviously, the windup of inflation is under way and will continue, as shown above, until something occurs to lower labor's wage demands or to raise productivity.

During 1978, with a productivity gain of .4 percent, worker hourly rates increased by 9.3 percent (Harman 1979).

Economically, lagging productivity surfaces as a steady reduction in the standard of living level for Americans. The U.S. now ranks fifth in standard of living as compared with other countries. This is a drop from first in 1972, a key period in the productivity decline of our nation ("The Reindustrialization of our Nation" 1980).

Real gains in salary work somewhat the reverse of the inflationary wage-spiral described earlier. Real gains in salary are a reflection of real gains in productivity. Glenn Watts, president of the Communications Workers of America, pointed out that organized labor is very concerned about the country's poor productivity growth, especially because it is recognized that the well-being of the worker stems in the last analysis from the nation's productivity (Watts 1980). The growth in real wages tracks almost exactly with productivity growth in the United States. When productivity growth ran at 3 percent and above, real wages were growing at 3 percent and above. When productivity fell to about 1.5 percent, so did real wages.

In the last few years, with productivity at the zero or minus level, real wages are also at the zero or minus level. The only way for people to increase their paychecks is to improve productivity. All other "improvements" in wages are false and inflationary. Again, according to Dr. C. Jackson Grayson, chairman, American Productivity Center (Waldman 1980), to maintain a high level standard of living, we must embard upon an intensive ten-year effort to increase productivity.

Economically, lagging productivity impacts directly on unemployment (Waldman 1980) in two ways. First, lagging productivity in selected U.S. industries provides competing foreign countries with a competitive edge. That competitive edge often means a reduced market share for U.S. manufacturers and layoffs/unemployment, as was recently witnessed in the industries of steel, automobile, and rubber, to mention a few. Underemployment of U.S. workers often results from this same competitive edge being held by foreign companies. As highly skilled jobs go over seas, remaining work, though plentiful at times, calls for a reduced skilled level. Already, since 1972, the U.S. has slipped from second to seventh in percentage of skilled workers to the work force (Drews 1981). Our exports steadily decline in the amount of technical skill required to produce them, while our imports increase in the technical skill required. We have fallen from 29 to 26 percent in the world's share of skilled workers between 1963 and 1975.

Secondly, lagging productivity, as described earlier, causes increased inflation. Unfortunately, partially because lagging

productivity is not identified as a substantial cause of inflation, economists continue to use traditional monetary and fiscal policies to restrain inflation. These policies have already caused a poor unemployment situation. Consequently, stagflation continues to be with us. To reduce inflation by 1 percent we must throw 1 million people of out of work for three years thus adding over $25 billion to the national deficit (Carnevale 1981b).

Economically, according to General Alton Slay, Commander Air Force Systems Command, as our productivity growth rate declines, U.S. industry is less competitive and our world market share declines. This declining competitiveness weakens our dollar and further increases the cost of imports, including oil and nonfuel minerals. The smaller market share, coupled with a weakening dollar, means less capital for investment in productivity-enhancing technology and modern equipment to maintain our competitiveness. This, in turn, leads to an even less competitive world position--truly a circular problem approaching the status of a "Catch 22" that impairs further productivity growth (McKee 1981). To maintain and improve our economy, we will need to invest in and redevelop the industrial base of our nation. Increased productivity will be a necessity.

Economic indicators of increased unemployment, inflation, lessening of the standard of living, and reduced ability to compete internationally need to be addressed from the viewpoint of increasing productivity. A recent candidate for the Republican gubernatorial nomination in Ohio commented that for his state to move ahead economically, it would need to look at exploring new technologies and new industries. When asked why he is

running for governor, he told the audience simply, "If Ohio doesn't make it, the country won't make it." Indeed, the issue of productivity and the economic ramifications are being felt. The Committee for Economic Development recently stated, "This country cannot reasonably hope to control inflation, raise real income, and improve the quality of living unless the unfavorable trend in productivity is reversed" (Bolino 1981).

What We Need to Know About Productivity

Productivity now commands a prominent place in all discussions of national economic policy, not only because it is a main component of the gross national product (GNP--the major determinant of the economic welfare of a nation), but especially because of its recent slowdown (Bllino 1981). However, it is apparent that much more is said about productivity than is known about it. Sound research and theory are badly needed. Perhaps the primary reason we are not doing a better job of increasing it is due to confusion about the finding and measuring of the concept. Few concepts have so many different definitions and interpretations as the term productivity, yet few terms are so often used as if a precise definition existed (Hershauer 1978).

It should be pointed out that the term "productivity" is not even used clearly or consistently in the professional literature. Sometimes it is used in its broad, all inclusive sense to mean overall performance and sometimes in its narrower sense of output per unit of time or cost (Katzell 1975). Some persons assume "productivity" means using more capital and less labor, while others believe it means working harder, faster, or smarter. Some would say "productivity" means increasing output, while others say it means producing the same output using fewer resources. Indeed, it is a slippery term to define, with speakers and listeners often having different definitions which can make communication difficult to impossible (Kershauer and Ruch 1978).

Productivity is not production, but it will improve our production performance. Productivity is not profitability, but it will improve profitability performance. Generally, productivity is viewed by management and union policymakers as the overall effectiveness and performance of individual organizations (Katzell 1975). More specifically, productivity is a relationship or ratio between the goods and services we produce and the resources consumed to produce them. It is a relationship or ratio between outputs and inputs. The outputs are the goods and services produced for our clients and transfeered to them through the price mechanism. The inputs are four: person-hours of work, materials, energy, and capital (Christopher 1980). In the broad sense, it should refer to the ratio of all outputs of an organizational entity to all of the inputs employed (Hershauer and Ruch 1978).

Simplistically put, productivity can be viewed from a narrow perspective by examining the ratio of one input factor such as labor to one output factor such as pieces produced. However, it is generally agreed that a broader perspective should be maintained. A broader perspective looks at the multifaceted factors composing input and output, and is sometimes referred to as the multiple input/output, total factor input/output, or value added input/output (Arai 1981).

This expanded view more accurately paints the picture of the real ratio between inputs and outputs of a company, industry, or nation. If, for example, New York City were to measure only the tons of refuse collected per sanitation truck shift, less

frequent garbage pickups would mean more pickup per stop per truck shift, but less sanitation and less service to the people. If the Bureau of Accounts of the U.S. Treasury Department only measures the number of checks and bonds issued per employee per year, the effect might be to reduce service in handling exceptions and correcting errors. If only the traffic tickets issued by a police officer are counted, the incentive for the officer is to issue routine traffic violations because of their speed rather than to become involved in serious offenses such as recklessness or drunken driving because of the amount of time consumed in such arrests. College professors who are rated by their publications have an incentive to devote more time to research and less to teaching and conferring with students. The concept is simply that inputs and outputs need to be viewed from an expanded viewpoint (Heaton 1977).

Labor and management are beginning to take into account other less tangible features such as absence of disruption, trouble, sabotage, "shrinkage," and other indications of unrest in an organization, as well as low rates of absenteeism, turnover, and even customer satisfaction (Katzell 1975). Therefore, inputs might include many of the variables listed above such as sabotage, absenteeism, turnover, such things as scrap and rework jobs, as well as people costs, energy, materials, and plant and equipment capital. Our concept of outputs needs to be expanded beyond simply what we produce to include the long term benefits to the company such as: improved profits for the shareholders, improved international position, improved benefits and quality

to the consumer, improved quality of work life for the workers, and other factors such as environmental and community impact.

The expanded view of examining inputs/outputs, can readily be seen when one considers measuring the productivity of the service sector or the public sector. Indeed, the quality of the decisions made by people in these job areas is often more important than the quantity of paper processed (Auerbach 1981). In Productivity in Service Organizations (Heaton 1977), the author describes four essential factors in calculating the productivity of a service organization. Those four factors are: input, processing, output or follow-up, and timing and coordination. This approach acknowledges the interrelationship of a number of factors in determining the quantity and quality and effectiveness and efficiency of productivity of an organization. Indeed, the quality factor alone is essential to productivity measurement. It is perhaps more important to know about the quality of a car produced on a production line than it is to simply have quantitative measurements on how many cars were produced in a given day. Additionally, simple productivity measurements are not sufficient in measurement terms in a society that places an increasing value on human concerns and human attitudes. These factors need to be plugged into the input and output ratios of productivity.

In a report prepared by the Committee on National Statistics, the authors stress the difficulty in truly accounting for productivity gains and losses, and they stress the complexity of accounting for economic growth. Interestingly, they suggest that perhaps measuring productivity is still more of an art

than it is a science, and certainly it is a total lifetime study in and of itself (National Academy 1979). However, that same report suggests that a sufficient body of information and data does exist to allow worthwhile measurement to take place (Striner 1981).

Though it is not the purpose of this paper to deal with the construction of complicated productivity indexes, some presentation of productivity formulas is helpful. Productivity should be measured because it can provide an information base for goal setting and for monitoring of achievement performance, reveal problem areas that would not otherwise been seen, and be a source of learning and participation. Also, people work for what counts. With productivity measures as the bottom line for all jobs and units, productivity will be one of the performance measures that count. Nationally, it is critical that we have a grasp of productivity losses or gains (Christopher 1981).

To add to the clarification of this concept, presented below are five formulas that help to show four separate key input factors (labor, materials, energy, capital) which are important. Formula number five represents the manner in which all inputs are used in developing productivity ratios. The output, however, does not adequately reflect the variety of outputs that also should be measured.

Once the reader grasps the basic concept of productivity, and endless variety of ratios is possible (Mali 1978). Presented below are just a few of the basic ratios that can be developed. What one must remember is that a total productivity ratio measurement encompasses a multitude of factors.

PRODUCTIVITY MEASURES

$$1.\ \text{Labor productivity} = \frac{\text{Output at base period prices}}{\text{Labor input at base period prices}}$$

$$2.\ \text{Materials productivity} = \frac{\text{Output at base period prices}}{\text{Materials input at base period prices}}$$

$$3.\ \text{Energy productivity} = \frac{\text{Output at base period prices}}{\text{Energy input at base period prices}}$$

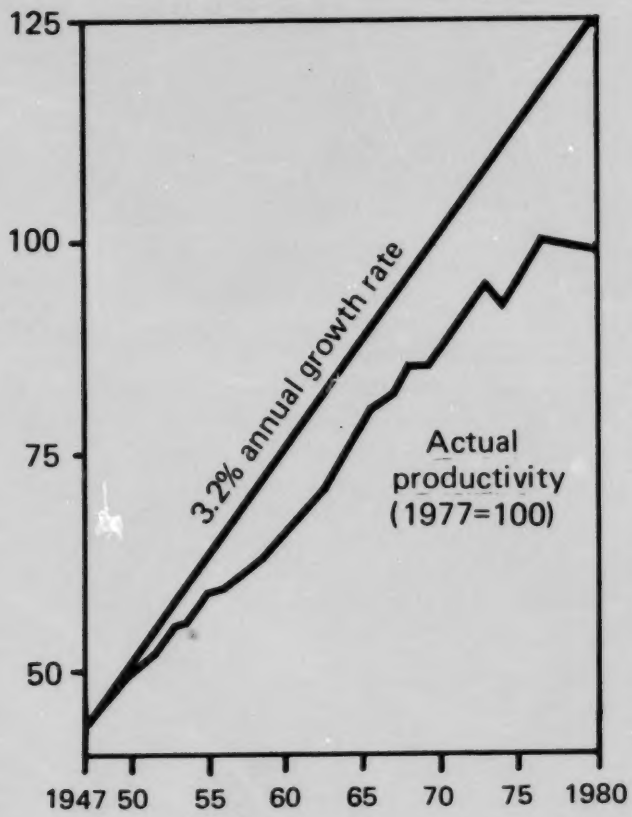
$$4.\ \text{Capital productivity} = \frac{\text{Output at base period prices}}{\text{Capital input at base period prices}}$$

$$5.\ \text{Total productivity} = \frac{\text{Output as base period prices}}{\text{Total of all inputs at base period prices}}$$

Historically, increases in total factor productivity grew from .3 percent a year throughout most of the 19th century to 2.4 percent after World War II. After 1966, however, there was a disturbing deceleration in the growth of productivity: down to 1.6 percent before 1973 and .8 percent for the period between 1973 and 1978. Since 1978, productivity levels have continued to decrease, actually falling below their previous years productivity level. Figure 1 reflects the reaching of a plateau in productivity growth in 1978 and the continued decline since then (Bolino 1981).

By the end of World War II, the U.S. productivity level was almost double that of the United Kingdom, more than double that of France, three times the level of Germany and Italy, and seven times that of Japan. The United States seemed to be satisfied

Figure 1 Output per Hour of All Persons Employed in Private Business Sector (1947-80)



Source: American Productivity Center, Houston, Texas, 1981.

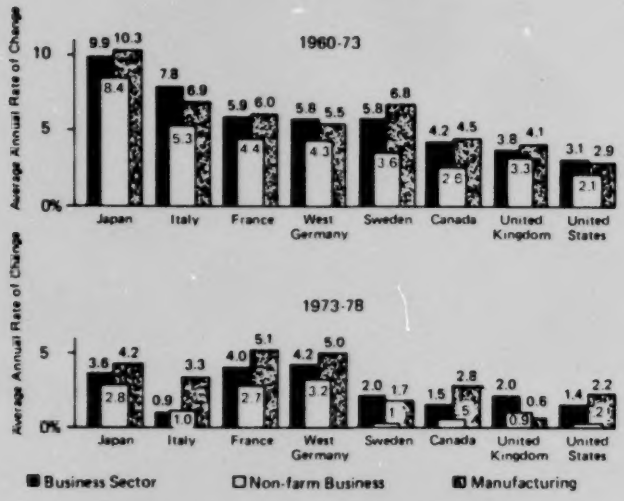
with its mature industrial facilities and techniques and rested on its affluence. While the U.S. continued as the world leader for important high-technology industries, inadequate attention was not devoted to innovation and techniques improvement in many of her basic industries.

Japan and Western Europe rapidly rebuild war-devasted industrial facilities by the application of a substantial percentage of their national product for industrial investment. The process was greatly augmented by the rapid dissemination of best-practiced knowledge through new information technologies and by the Marshall Plan program of technical assistance. Germany, Japan, France, Belguim, and Italy recorded especially notable productivity growth rates. By 1973, Canada, the Netherlands, Sweden, Belgium, and France were at levels of output per hour at least three fourths of the United States. Figures for Japan and West Germany were more impressive, especially in manufacturing (see figure 2).

The productivity improvement in these countries has been substantial during a period when the United States productivity has continually declined. Interestingly enough, with the present rate of productivity improvement in other countries, soon, the United States will be surpassed in productivity level by foreign countires. Figure 2 reflects that takeover. It is now projected that France's real output per hour will exceed that of the U.S. in 1985, Germany's productivity will overtake the U.S. in 1987 and the takeover by Japan will occur in 1999 (Sadler 1981).

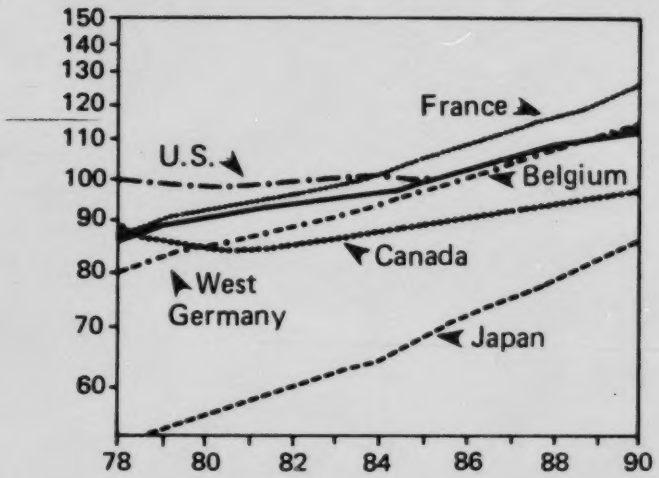
No longer is the debate over whether or not a real productivity problem exists in our country. Burton Malkiel, chairman of

Figure 2 Rates of Growth in Labor Productivity: Total Business, Nonfarm Business, and Manufacturing Sectors (Eight Countries, 1960-73 and 1973-78)



Source: American Productivity Center, Houston, Texas, 1981.

Figure 3 Projected International Productivity Trends, 1978-90 for Six Nations Leading in National Productivity Levels*



* "Productivity" is expressed in terms of Real (1970$) GDP per hour worked.

Basic data: Angus Maddison, 1981 revision of data in the paper, "International Productivity Comparisons—National Differentials."

Source: American Productivity Center, Houston, Texas, 1981.

the Department of Economics at Princeton University recently described the unusual falloff in U.S. productivity as "the most basic sickness of the U.S. economy" (Skibbons 1981). In an article by John Connally, former governor of the state of Texas, he commented that beyond any question, productivity is vital to the economic future of this nation (Connally 1980). The late Dr. Patrick Haggerty, general director of Texas Instruments, in making a presentation to the American Productivity Center, felt that there is little debate that productivity growth in the U.S.A. has slowed and that the slowdown affects inflation, unemployment, the balance of payments, our standard of living, and our national and international economic strength; the slowing is a fundamental, secular change, and not merely a cyclical slowdown; and the causes of this slowdown are not clearly understood, nor are the actions to reverse the slowdown Haggerty 1980).

Dealing with the causes of lagging productivity, indeed, can be a lifetime study in and of itself. The experts have three major positions regarding the causes of lagging productivity. These positions are (1) the cause of lagging productivity since 1973 is a mystery; (2) one to three sole factors are the prime causes of lagging productivity, and (3) multiple factors have caused the lagging productivity. One should be cautioned that the complexity of factors and their interactions and limitations of the data concerning them engender uncertainties surrounding productivity projections. Therefore, a careful assessment of the outlook for productivity growth becomes an exercise in examining current and historial movements to

separate the transitory factors from the more permanent ones (Kutscher 1977).

The disagreement concerning the causes of productivity is real (Bolino 1981). We do seem to lack a precise knowledge of how all these factors interrelate, and we are not clear as to how to approach the process of determining the cause or causes of the slowdown that capture all the effects. Interestingly enough, prior to 1973 things were so good that nobody kept good records or spent much time examining productivity; therefore, today the analysis is that much more difficult.

Dr. Edward Denison, formerly of the Brookings Institution and now with the Bureau of Labor Statistics, is a well-known expert on the topic of economic growth of the United States. In his detailed examination of the economic growth and slowdown of this country since 1929, he has serious problems accounting for the real cause of productivity decline since 1973. In fact, he states, "What happened is, to be blunt, a mystery." Though he can account for growth and economic slowdown until 1973, it is from that point until the present that he cannot account for the productivity decrease.

A number of authors believe that the cause of productivity decline rests with from one to three major causes. Some of those experts and the causes they have identified are: the slowdown in growth of high productivity industries (Bolino 1981); the weakness of capital formation for the period between 1973 and 1978 (Kutscher 1977); the end of farm-to-nonfarm shift hours (Kutscher 1977); and the lack of investment in people, machinery, and research and development (Skibbons 1981).

It should be remembered that often the above authors and others, in identifying one major cause of slow productivity growth, fail to examine related factors which may also impact upon the problem because they lack the measuring devises for such fine measurement.

Striner believes, as do many of the writers on the topic, that a great deal of factors need to be understood and dealt with if we are to increase our rate of productivity gain, and that we cannot choose to deal with simply one at a time. The fact is, we are dealing with the simultaneous equation. A compilation of the causes generally listed by those who feel lagging productivity is caused by a multitude of factors include: curtailment of expenditures on research and development; reduction of patent applications which thus decreases the opportunity for major new advances; decline of the yankee ingenuity; and lag in application of knowledge due to the aging of capital.

Additional causes are: governmental regulations such as OSHA, governmental paperwork, loss of the work ethic, error in data, changes in quality of management, and the rise in energy prices. Also mentioned are: lack of business investment in technology and people, lack of personal savings, declining rate of capital utilization, relatively low rate of productivity in the service industry, increased number of less experienced young workers; minorities, and women joining the work force, and fluctuation of the economy. Finally, also listed are: end of shift in labor from agriculture into industry, escalation of inflation, late deliveries, uncoordinated organization, work dissatisfaction, disruption of work commitments, and lack of government tax incentives. A number of authors list the

multiple cause approach (Striner 1981; Denison 1979; Christopher 1981; Waldman 1980; Jorgenson 1980; and Parrott 1981).

Though it is difficult to be precise about the cause of lagging prductivity, two key causes are repeatedly mentioned by writers in the field and economists, and have been key factors in other countries and in some companies in the United States. Those two factors credited with a major portion of the blame for lagging productivity are lack of technology (plants, equipment, processes), and lack of investment in human resources (knowledge advancement and human resource development). The most detailed study done on this topic, by Dr. Edward Denison, demonstrates the importance of these two factors (Denison 1979). Interestingly enough, when defined as the educational level of workers and the advances in knowledge caused by ideas of the work force, human resource development contributed more than one-third the value of technological advancement in terms of economic growth during the period of 1948 to 1973. For persons responsible for human resource development, this is of critical importance. Too often, advances in technology have been given the credit for past growth and the responsibility for future recovery. Economic figures indicate that human resource development is equal to or exceeds the value of technological advancement in past economic growth and should be given equal or more attention in years to come as a major source for economic recovery.

It is critical to understand that, though difficult to define, lagging productivity (whose cause is sometimes hard to identify and whose existence is tricky to measure) reveals itself as the major source of our economic illness. Economic problems are

caused by lagging productivity. Lagging productivity is caused in great measure by lack of investment in human capital and technology.

Basically, such economic problems as inflation, high unemployment, poor personal economic strength (standard of living), and inability to compete effectively with foreign countries is due to the fall in productivity growth (Jorgenson 1980).

By treating the cause of our economic difficulties--lagging productivity caused by lack of investment in human capital and technology--we can expect improvements in the bottom line for a company and for persons themselves (Thurow 1970). Such an investment would reduce inflation, reduce employment by increasing individual productivity, and thus increase the standard of living (Meyer 1977). Therefore, if we are to have economic growth and reduce inflation and create jobs, there must be an increase in national productivity (Taylor 1981).

The role of human resource development in increasing productivity and thereby improving the economy is great. We must understand the yet disconnected economic and political signals that suggest new directions for education and training policy. Unless we understand the role of public and private education and training in a new economic policy context, the possibility of disconnected and counterproductive efforts to improve productivity and the economy is great (Carnevale 1981a). Public and private training and retraining of the already existing work force can prove to be an excellent means of providing the all-important link between employment and training efforts in economic development strategies (Wolfbein 1981). Those in occupational education and training can be the key factors in shaping and revitalizing the

American economy. Without a highly skilled, trained work force, no amount of economic medicine will do the trick (Taylor 1981). In the next section, we will look more closely at the inter-relationship between the economy, lagging productivity, and human resource development.

What We Need to Know About Economics

Productivity, the economy, and human resource development are closely interrelated. To clearly understand this relationship, one must focus attention on how the economy has grown and slowed during the past thirty-five years, the controls that have impacted on the restraining and stimulating of the economy, and the interrelationship of our present economic conditions with slacking productivity and the available economic tools for dealing with the situation. This section will provide the reader with those insights.

Between the mid-1940s and the early 1970s, our economy was marked by unprecedent expansion. The pent-up demand caused by World War II rationing and saving and the unavailability of goods during that period of time, coupled with the postwar baby boom, purchases of homes, flight to the suburbs, investment in first and second cars and all the supportive good and services necessary to accompany such a tremendous demand were key forces in driving a strong economy during this period of time. Economically, this period saw relatively no inflation because the productivity gains and salary increases had a positive relationship between one another. This allowed for an improvement in the real standard of living or purchasing power of Americans, low unemployment, stable prices, lack of serious foreign competition, and strong productivity gains based on the increased level of education and advancement of knowledge by individuals in the business world coupled with great progress in technology.

Additionally, the good savings accumulations by consumers during this period made money available for loan a low interest rates for growth in the comsumer good business and provided money for business people to invest in plant expansion (Carnevale 1981b).

Since the 1940s, the United States has relied upon the teaching of Keynes to monitor and adjust the economy through monetary and fiscal policies that are targeted to reduce inflation, stabilize prices, and minimize unemployment. Taxes, federal spending, and the availability of money as regulated by the federal reserve have been key controlling factors. For example, spending is relied on to strengthen the economy. The basic concept is simply that you can spend your way out of a recession and reduce unemployment by cutting taxes and boosting government spending. The central proposition of the Keynesian model is that unemployment and inflation have a very inverse relationship to each other, like the ends of a seesaw (Feldman 1981). During this period of growth, this traditional monetary and fiscal policy approach has worked well to stimulate or cool the economy, without runaway inflation or severe unemployment side effects (Carnevale 1981b).

Compared with the period from the 1940s to the early 1970s, the period beginning in the 1970s until the present shows a marked contrast. The strength of the economy, so important and noticeable during the early period, is no longer present. Perhaps enough has been said in earlier sections about the weakening of our economy base. Suffice it to say that we no longer enjoy salary gains related directly to productivity gains, increased standard of living, low unemployment, and stable prices. More importantly, we no longer experience the continued increase

in productivity levels from year to year, and unfortunately we no longer enjoy a world market almost void of foreign competition. The driving forces noticeable in the 1940s and 1950s such as the baby boom, flight to the suburbs, and pent up demand no longer seem prevalent. We now have inflation and stagnation at the same time, which is being called stagflation (Feldman 1981).

Simply stated, the economic controls used during the mid-1940s to early 1970s seem to no longer have the total effect on the economy for which they were designed, as is agreed upon by most economic observers. Glenn Watts, president, Communications Workers of America, indicated he believes the government's policy in recent years to curb inflation by restraining demand has failed to halt inflation and is just leading to additional decline in real wages, slow growth, and persistently high levels of unemployment. He feels the old theory of reducing inflation by reducing the money available to purchase a limited supply of goods no longer seems to be holding up since we do have inflation, unemployment, and economic stagnation all at the same time (Watts 1980). In the telephone conversation with Anthony Carnevale, (1980c) this a recognized economist expressed his beliefs that the simple supply-side and demand-side economics policies used in earlier years have not worked successfully since the 1960s when a good ratio was maintained between productivity and wage gains and when there was a lack of foreign competition. Indeed, many feel that a rapid change may occur, moving us from the traditional economic controls of monetary and fiscal restraint and stimulation to a more broad approach to economic recovery (Feldman 1981). Basically, most economists agree that something more is amiss in the American economy than an unduly high

reading on some economic indicators such as inflation, unemployment, productivity growth, and savings (Etzioni 1981).

Traditional economic controls have not only not worked since the 1960s to speed economic recovery, but in some cases those controls have caused actual economic problems. According to Budget Director, David Stockman (Greider 1981), traditional economic policies actually exaggerate inflation and unemployment. According to economist Rudolph Penner of the American Enterprise Institute, "In large measure, you're stuck with the choice between unemployment and inflation. The politicians who say they will not use high unemployment to cure inflation are just dreaming" (Kelly 1982). Using traditional economics, actions taken to reduce inflation by one percentage point cause a decrease in employment in excess of 1 million persons, which in turn adds over $25 billion to the national deficit.

We need to ask the question, why don't the traditional economic policies work? Economists generally agree that our economic problems no longer reflect merely a demand-driven inflation that can be cured by trading X points of employment for Y points of inflation. Most seem to agree that the foundation or infrastructure of the foundation of the American economy has weakened and needs shoring up (Etzioni 1981). Conventional methods of economic analysis have been tried and found to be inadequate. Clearly, a new framework will be required for economic understanding that addresses the infrastructure problems inherent in our economy, which are cuased by lagging productivity coupled with foreign competition (Jorgenson 1980). Repeatedly, the consensus is that traditional monetary and fiscal policies that alter the

supply of money need to be enlarged, adding factors that impact upon the engine that drives the economy (which is a productive business sector). By improving the infrastructure, we are in essence improving the business base of our nation in terms of technology and human resources (Carnevale 1981b). Traditional economic policies fail to focus directly on shoring up the business sector and they do noy pay any attention to public education, employment, training and social services, and institutions as having an impact on the economy.

To expand upon the traditional monetary/fiscal policy in such a manner to improve the productivity of the American business sector, three separate economic approaches seem to have emerged. These approaches are summarized by Dr. Amitai Etzioni, director, Center for Policy Research, Washington, DC. He arranges the three economic approaches on a continuum from radical conservative to moderate centrist to left liberal (Etzioni 1981).

At the radical conservative end of the spectrum is what is sometimes called supply-side economics. This approach is upheld by persons such as Dr. Milton Friedman and basically it says that what ails our economy is an overinvolvement of the federal government in the lives of people and businesses. The remedy is to move government out of the lives of business and the consumers and to return money back to local sectors to use as they wish. The concept is that this money will spark additional productivity output. This approach is nontargeted, allowing the marketplace to operate based on the demands for goods and services. Some would argue that this approach does not directly guarantee an impact upon the infrastructure of the economy--that is, it does not necessarily improve the productivity of the industrial base.

At the other end of the spectrum is the left liberal category. This position holds the notion that government needs to intensify its involvement in the economy. Basically, business and industry and people have not invested their money correctly on equipment, technology, human resources, research and development, and so forth. The solution would lie in government-guided collaborative efforts in which business and labor pull together. To some degree this might reflect the attitude of the Japanese Ministry of International Trade and Industry. Industries that are designated as "winners" would be showered with government-provided subsidies, loans, loan guarantees, research and development write-offs, and other types of support. The losers would be buried or "sunsetted." Arguments against this approach reflect the concept that this idea might look like creeping socialism and that most people question whether or not the government has the data, the insight, the ability, and the confidence of the public to run such a government-centered economic policy.

At the center of the continuum is the third approach. The author refers to this approach as reindustrialization, or what many call real supply-side economics. A basic component of this approach to economic improvement is the emphasis on investment in both human resources and technology to build up the industrial base of the country. Real supply-side economics is defined by Professor Lester Thurow, professor of economics and management at MIT, as a systematic effort to increase the quantity or quality (supply) of labor and capital entering the economy and to improve the efficiency with which they are used (Parrott 1981). The emphasis in real supply-side economics is on improving the engine of the economy, which is the industrial base. The focus

is on improving both the human and technical capital of the business sector. In this era, it will be said that what is good for General Motors and other individual enterprises born and unborn is good for the country. And will be an era that reemphasizes capital formation, it will be an era that reemphasizes productivity, and it will be an era in which the new slogan will be revitalization, reindustrialization, and recapitalization. Vocational education and occupational training are the educational components of the real supply-side approach for economics (Feldman 1981). Real supply-side economists recognize the necessity for education and training due to its impact on the development of human capital in the interest of a productive and mobil work force (Carnevale 1981b).

In summary, the economic controls of the future will be expanded to impact directly on improving the industrial base (both human and technical capital) in this country, utilizing the concepts of real supply-side economics. Occupational education and training will be key components to this strategy. It should be pointed out that additional study and research is needed in this field by both economists and vocational and occupational training and education specialists. Economics is not an exact science and forecasts of economic development are thus subject to considerable inaccuracy. Unlike the scientists, economists cannot perform experiments in controlled environments. As a social science, economics needs input from many different sources (Meyer 1977). The issues are complicated and have many loose ends and unsettled questions (Bailey 1971). The following section will closely examine the specific importance that training and occupational education will have as a key part of the real supply-side economics.

Human Capital Investment - A Significant Part of the Answer

Real supply-side economics keys in on improving the industrial base. Of particular importance is the fact that real supply-side economics places major emphasis on improving the human and technical capital of enterprise as a fundamental approach to economic recovery. This unit will help the reader understand that human capital improvement through training is as important as improvement in technology to economic recovery. It will summarize the leading economic theorists' ideas on human capital investing, the experience of other countries, and the scope of the problem of underdeveloped human capital in the United States. Understanding these concepts is essential for leaders in training and occupational education. The point is that training and occupational education as an element of real supply-side economics can become a critical intervention for economic recovery.

Improving productivity and economic recovery requires investment in human and technological capital. However, rarely is human capital given the attention is deserves (Rosow 1979). Some feel the emphasis on human capital investment has all but disappeared in America as an economic priority with our government, though mounting evidence from other countries shows the impact that investment is human capital can have on increasing productivity and providing economic recovery (Skibbins 1981). Though technology is important, increasingly, many feel that human beings and their development are even more important. It is being recognized that economic problems revolve around productivity, and that productivity relates more directly to labor and less to capital technology (Parrott 1981). The fact of the matter is, according to available economic growth research for the period between

1948 and 1979, human capital improvements accounted for a larger share of productivity growth than machine capital (Carnevale 1982). Some figures indicate that too much attention has been given to machinery capital investment to increase productivity, since investments in plants and equipment have accounted for only about 10 percent of the growth over the years while the advances in technological knowledge now have increased education of the labor force as it accounts for over 45 percent of the growth (Watts 1980). Dr. Dale Parnell, president, American Association of Community and Junior Colleges, questions the logic of encouraging investment in machines rather than in people first. In a personal interview, (Parnell 1982) he indicated that research shows human resource investment like the GI bill to be more effective than machine capital investments. Parnell stated, "our society will be evaluated based on what we do with our people, not our machines. Not to use people well is wasteful." In comprehensive research done on the period from 1929 to the present, Dr. Edward Denison, senior fellow, Brookings Institution, it is shown that more of the increase in growth, especially during the period from 1948 to 1973, was accounted for by human learning, training, and advances in knowledge. Capital investment in equipment and machines accounted for less of the growth than education, training, and advances in knowledge (Denison 1979). Though there is no evidence or apparent rationale for investment incentives that favor machines over human capital, the trend by government is certainly to support machine capital investment through depreciation allowances and so forth, rather than to give equal attention to human capital investment (Carnevale 1981b). Since human capital is not well understood, it is not given the

financial incentive at the federal level as is machinery investment. The late Congressman William Steiger put it this way, "We seem to have little problem in giving tax breaks for capital investment and machine depreciation, but make great resistance at the suggestion of tax incentives for employee training and job upgrading" (Rosow 1974). Indeed, those in training and occupational education have a good case to make for investment in human capital.

The concept that human capital investment is critical to increasing productivity and promoting economic recovery is supported by the studies of human capital economists. Since the late 1950s, this area of study has continued to grow. For decision makers and practitioners in the field of training and occupational education, it is important to know of this school of economic thought that supports this interrelationship concept. The next section is a very brief summary of some of the thinking of leading human capital economists. This will help the reader understand who these economists are and something of their major beliefs.

Dr. Edward F. Denison, a long time senior fellow with the Brookings Institution, now the associate director of the Bureau of Economic Analysis of the U.S. Department to Commerce and senior fellow emeritus of the Brookings Institution, has carried out five landmark studies of the sources of economic growth or growth accounting. His publications such as The Sources of Economic Growth in the United States and the Alternatives Before Us, Why Growth Rates Differ: Post-war Experience in Nine Western Countries, How Japan's Economy Grew so Fast, The Sources of Post-war Expansion, and other writings qualify him as an expert in the field of understanding growth and decline of economics.

In a recent publication, Accounting for Slower Economic Growth: The United States in the 1970s, Denison makes separate measurements of a number of key factors that have impacted upon the growth and slowdown of the U.S. economy, particularly since 1948. (Denison is known for his detailed analysis of many factors impacting upon the situation and the historical perspectives he has gained from his studies going back to the late 1920s.) With detailed analyses of a multitude of data, he repeatedly demonstrates the impact that education and advances in knowledge when applied to technology and manufacturing processes, have had during our periods of great growth and slowdown. He graphically and in great detail demonstrates the important role that this type of progress has over traditional investments in capital and machinery improvements. His data indicate that education and advances in knowledge have had much greater impact on economic growth than has capital investment (Denison 1979).

Also well known for his commitment to the importance to human capital investing as an impact on productivity and economic recovery is Dr. Amitai Etzioni, director, Center for Public Research, Washington, DC. He is a sociologist and professor at George Washington University. His opinions on the need for and components of the reidustrialization of America often appear in the New York Times and the Washington Post. He makes frequent appearances on national television and has served as a senior advisor in the White House. He is recognized as a leading spokesman on the topic of the reindustrialization of America and presents the primary thesis that for America to maintain a high standard of living and provide long-term national defense,

an intensive ten-year effort to increase productivity is necessary. He believes that while technological and financial factors tend to command the most attention in discussions of industrial development, the importance of human capital should not be underrrated. Industrialization requires a labor force that is motivated, educated, and trained to staff factories, offices, and laboratories. He believes that economic policies should be targeted specifically at the rejuvenation of productive capacity with emphasis on technology and people. He emphasizes the human capital concept that vocational education belongs on the agenda of reindustrialization, primarily because of its concern with the size, composition, and quality of human capital (or labor), a key elementary element in the reindustrialization process. He believes too that the infrastructure of our economy, the industrial base, is weak and will need to be improved so that our economy may once again grow (Etzioni 1980, 1981).

Dr. Dale Jorgenson is repeatedly listed in the literature for his work in relating the impact of human capital investment on productivity and economic recovery. He too reflects the opinion that traditional approaches to examining and controlling the economy have not been working and that new methods will need to be tried and a new framework for economic understanding developed. Part of that new framework will be a concentration on the impact of human capital and technology capital as they relate to productivity. He has found that human capital is indeed an important factor to economic growth and slowdown (Jorgenson 1980). Other writers, such as Schultz who has studied economic growth, believe that schooling is a major support to human capital and maintains that contributions to schooling increase future

productivity (Evans 1981). Another writer, recognized for his intensive work in the study of macroeconomic theory, is Martin J. Bailey, associate dean, Graduate School of Management, University of Rochester. He too studies and writes in the area of national income, production, employment, recession or depression, related topics, and their interrelationships. His writing echoes the belief that productivity is impacted upon by technology and human capital investment, and by the need for human capital investment to improve productivity and economic recovery (Bailey 1971).

Dr. Lester Thurow, a noted authority on human capital and writer of, Investment in Human Capital, believes that traditional economic thought by such persons as Adam Smith and Mary does not consider the important role that human capital has in increasing productivity. He believes that recent findings are beginning to show the major contribution that human capital (in the forms of skills, talents, and knowledge) has had on economic growth and productivity in our country. He sets forth the concept that human capital investment is a sophisticated economic tool, though more study is needed in this field (Thurow 1970).

Dr. Anthony Carnevale, consulting economist with the American Society for Training and Development, has written perhaps more than any other in the last three years on the impact of human capital investment on increasing productivity and thereby improving the nation's economy. He believes that as a nation, we are just beginning to realize the importance of the human factor in production. Citing various studies, he points out the lack of continued investment in the human resources of our nation as compared with that of other nations during the last fifteen years. The impact it has had on our level of productivity and our economy

is considerable. Citing economic studies that indicate that real growth in productivity has been caused by human investment rather than equipment and machinery investment, he believes that the direction for economic recovery will include, as part of its strategy, an important reliance upon human capital investment. The continued lack of attention to the skill level of our workers and the lack of worker skill utilization on a fuller scale in the work place have contributed to the plateau effect of our productivity level. As seen by Carnevale, human capital investment is an often unrecognized sleeping giant that can help our country recover and advance (Carnevale 1982). Persons and organizations such as Joji Arie (1981), director, Japan Productivity Center; the American Society for Training and Development; Dr. Fred Schuster, professor of managment, Florida Atlantic University; and Delmar Landen, director, Organizational Research and Development, General Motors (Landen 1981) believes that human resource development will be increasingly recognized as the key to achieving national productivity goals and the improved economic health of the nation and its people in the 1980s. Indeed, human capital investing will be pivotal to the economic success and increased productivity of our nation.

U.S. companies and foreign nations are repeatedly testifying to the fact that the theories cited above stressing the importance of human capital investment do work. U.S. companies who have adopted a heavy emphasis on human capital investment verify that it is effective to train and educate the work force and to apply that work force is new knowledge to advances in technology and productivity. Companies such as General Motors, Delta, R.G. Barry Corporation, Hewlett Packard, Control Data, IBM,

Wells Fargo, Kodak, and 3M are all examples of this. It is also true of countries such as Japan and Germany, who after World War II were at rock bottom in terms of industrial development. Since that time these countries have been dedicated to improving productivity in all sectors. How do they do it? They invested in capital equipment and in people (Waldman 1980). In particular, countries such as Japan, West Germany, Italy, and France show the impact that investment in human capital can have on increasing productivity. These same countries and the Soviet Union demonstrate their importance in human capital investment through their number of graduates in engineering, science, and the technical fields at both the professional and technician level. Personel visits by the writer to states such as Oklahoma, both South and North Carolina, Florida, and Ohio demonstrate the role human capital investment can have in state economic recovery. By launching massive programs to train, retrain, and upgrade their work force, these states are compiling an impressive record on just what can happen when we invest in human capital.

The facts and figures varify how the United States has failed to advance in the development of its human resources over the past ten years as compared to the emphasis that other countries are placing on human resource development or human capital investment. For example, the Bureau of International Labor Affairs reports that the decline in U.S. trade since the 1960s "is the result of differences in the growth of the net real investment in equipment and acquisition of labor skills through education and training." Between 1963 and 1975, the United State's share of the world's skilled workers fell from 29 percent to 26 percent. Internationally, since the early 1970s we have

dropped from second to seventh in the skill endowments of our workers, from first to seventh in the percentage of skill workers to population, and the skill content of our imports have increased while our exports continue to decline in their competitive advantage. Other countries are steadily increasing their graduates of engineering, science, and related technical areas at the professional and technician level. Japan, a country much smaller than ours, graduates 12,000 engineers per year, about equal to the U.S. Increasingly, the U.S. is importing engineers from other nations (Carnevale 1982). One university in Japan is said to have as many computers as all the big ten universities in the U.S. combined. Indeed, other nations testify to the importance of human capital investment and give us clues as to the direction in which we must move.

According to Anthony Carnevale, (1982) the future of private training lies with an expanded vision of economic policy, and an understanding of the importance of human capital investment and of how productivity improvement effects economic recovery. In the January 14, 1982 address delivered by the president of the United States in New York, the president noted the importance of private human capital as a far more valuable approach to economic recovery than other traditional approaches which have repeatedly not been successful (Reagan 1982). Simply stated, human capital is the catalyst in increased productivity (Auerbach 1981). We have for too long believed that a pre-college education was sufficient for most citizens, that a high-technology society could be run by a small group of experts and staffed by a large group of people with rudimentary knowledge

of "the basics." The assumption is obviously wrong. A complex society requires that each citizen be as intelligent and creative as possible. The cost to our society of not educating one person, not providing adequate job-related training, and not investing in human capital to improve the productivity in the industrial base of our nation is more than we can afford in terms of economic impacts caused by lagging productivity (as discussed earlier) and social consequences of crime, welfare expenditures and so forth. In summary, it is critical that decision makers for training and occupational education understand the importance of human capital investment and of the massive training and retraining of the already existing working population to improve productivity and to cause economic recovery. The economic theories of human capital investing, experiences of other countries, and the experience of some companies in the U.S. are manifold examples of the impact that human capital investment can have when used, and of what will happen if human capital is not utilized effectively. The challenges and opportunities for those in education and training are tremendous. The need for additional research and study in this area is obvious. The next section will help you better understand the revitalization effort that is needed during the next ten years and the directions that revitalization effort might take.

Reindustrialization

The fact that lagging productivity and its economically disastrous effects will require what some are calling reindustrialization, revitalization, or real supply-side economics may be obvious. Dr. Amitai Etzioni, (1980, 1981) who is recognized as the leading spokesperson on the topic of reindustrialization of America, believes that "for America to sustain a high standard of living and set aside the resources needed for national security, a least a decade of shoring up productivity capacity is required. In essence, we are in need of a period of reindustrialization." He feels that American society has been underdeveloping. Decades of underinvestment in the national economic machine have weakened America's productivity capacity. Coupled with relatively low investments in new plants, equipment, and research and development, as well as other factors, these strategies have resulted in an aging technology and an inability to compete with countries such as Japan and West Germany that rebuilt their plants after World War II. He believes we need a return to higher investment and innovation in the productivity sectors.

Dr. Herbert Striner, in Reindustrialization of the United States: Implications for Vocational Education Research and Development, points out that unemployment, low productivity, inflation, and an inadequate economic growth have a relationship to productivity (Striner 1981b). He feels that improvements must be made by 1986 or we will be surpassed by other countries. He feels America will need to learn the lessons of investing in

people and technology from other nations and will need to launch into a comprehensive program of improvement as was done in past years by Western Europe and Japan. However, to launch into such a program would be to admit that what we've been for the last ten years has been wrong. What will be needed will be the development of our technology, our labor force, and our national policies to foster such a direction.

Dr. Daniel Taylor, former assistant secretary for the office of Vocational and Adult Education, United States Department of Education, echoes the message that revitalization is needed in our cities, our rural communities, our energy supply, our schools, and our economy. He calls for a new partnership between government, labor, and business to approach the reindustrialization that is needed. The time has come to act. For the next ten years, the Office of Vocational and Adult Education has defined economic development in productivity as its number one priority (Taylor 1980).

Dr. Robert Worthington, assistant secretary for the Office of Vocational and Adult Education of the United States Department of Education recently called for vocational education to be a key factor in economic revitalization. He said, "The role of vocational education and reindustrialization, upgrading worker productivity, and improving defense capabilities will be addressed by the present administration" (Worthington 1981). William Roesch, president, United States Steel Corporation, in a talk given before the Fortune Corporate Communications Seminar on March 14, 1981 (Roesch 1981) discussed the current advertising campaign for U.S. Steel which says, "In these United States reindustrialization is not just an interesting concept... it is a vital necessity." The neglect of the past twenty years

will require a mammoth effort to revitalization this nation's industry and the economy in the next decade. We will not only have to utilize technology being used by other countries, but we will also have to develop our own new technology and find new more effective ways to train and work with our people.

Puematics, hydraulics, electromechanics, electric machinery, lasers, fiber optics, and the multiple uses of microcomputers and CAM/CAD/CAG represent the beginning of this reindustrialization process. With technology predicted to start changing about every four years compared to one change every thirty-five years in recent history, the implications for human resource development are almost staggering (Hopkins 1982). The time is now for the nation to revitalize its industry and for training and occupational education to be a key factor in that factor. A recent comprehensive international study done for Sentry Insurance Company by Louis Harris, under the advice of Amitai Etzioni, found that industry, labor, government, and the general population worldwide believes that our number one problem is that of lagging productivity. In reporting the findings, Dr. Harris noted that never before has he had all four groups agree to such an extent on one particular issue. Also, in comparing these recent results with results of a related study done in 1972, Harris said he had never before seen such a change in data over a period of eight years. In 1972, the various groups were accusing each other of causing the problem, where as today, they all see how each is involved in the problem and how all must work together toward the solution. Indeed, we are ready for this new challenge (Harris and Etzioni 1981).

Partnership Possibilities In Human Resource Development

It is critical that decision makers of training and occupational education understand the scope of efforts of business and industry to improve human productivity and quality of worklife. With this understanding, decision makers can better envision the magnitude of training that is and will be needed, and their role in delivering that training. To meet future requirements for workers, it will be necessary for those involved in occupational education and training to look critically at the innovations and changing technologies that have been brought to the reindustrialization movement and to determine their role in training workers (Hopkins 1982). Interviews with productivity/quality of worklife consultants, internal corporate resource development managers, leaders in the field of community and technical college administration, and isolated studies (Vaughn 1981) indicate not only that business and industry is beginning to do a great deal to improve productivity/quality of worklife, but also that the needs for training (which could be delivered through the community-technical colleges) are massive.

Like most studies on this topic, it is difficult to define all aspects of quality of worklife and productivity, discuss each in-depth, and project the characteristics of the working environment envisioned for the 1980s (Rosow 1974). Clearly, a major thrust of this study is to help decision makers better understand what business and industry is doing to improve human productivity and quality of worklife. With that in mind, a significant portion of this chapter will brief the decision

maker on human capital interventions being used by industry and the magnitude of the use of those interventions. To a much lesser degree, this chapter will briefly summarize, on a nation-wide basis the extent and scope of high technology being used by business and industry to improve quality of worklife and productivity. Productivity is being used here in the broadest sense as described in an earlier chapter. QWL referes to a process that encourages a high degree of employee satisfaction with work and work environment. Productivity and QWL are treated together in this study because many companies treat them as one in the same. Many experts note the practicality of working on both fronts simultaneously; a tremendous amount of overlap often exists between the two. Improving one frequently improves the other, much of the training needed for one is also needed for the other, and most national centers that study these areas treat both together. In researching one area, much of the research is applicable to the other. Academically, a case can be made for identifying both as distinct and separate entities (Bluestone 1977).

C. Jackson Grayson, director, American Productivity Center is encouraged by the growing interest in the subject of productivity by U.S. firms compared to just a few short years ago. He believes this is a very positive development in our country (Waldman 1980). In 1972 the first international quality of worklife conference was held in Toronto, Canada, attracting 50 persons, most scholars. In 1981, that same conference attracted over 1,500 delegates from throughout the world, 200 of whom were from organized labor ("Quality of Worklife" 1981). A

recent conference in New York titled "Productivity--The American Way" attracted over 700 business persons from throughout the country. Similar results and interest in workshop and seminar attendance are becoming commonplace throughout the nation. The spring 1982 convention of the American Society for Training and Development will highlight productivity and quality of worklife as its theme. An impressive flood of new articles and documentaries for business and the lay public are increasingly common. Nationally, over 1,000 case studies have documented business and industry efforts to improve productivity and quality of worklife ("Quality" 1981). Companies such as Control Date have launched massive programs to involve employees in organization for the purpose of improving productivity and quality of worklife (Miller 1982). Nationally, over thirty productivity and quality of worklife centers are in operation (National Center 1978). It is estimated that perhaps 50 to 150 such centers and subcommittees of established professional associations actually exist. Centers such as the Manufacturing Productivity Center at Illinois Institute of Technology and the National Center for Public Productivity are becoming more common. Productivity subcommittees such as the one affiliated with the American Institute of Industrial Engineers are also increasing in numbers. Perhaps the single largest productivity/quality of worklife activity is now going on in the military. Special offices assigned on almost every base with functional departments in each branch of the military and coordination provided by the Department of Defense have significantly added visibility to this movement (Wright Patterson 1982). Organized labor is deeply involved in studying and working cooperatively with

management to implement productivity/QWL throughout the nation (Kirkland 1980).

In December 1981, the president of the United States established a national productivity advisory committee for the purpose of studying ways to acheive higher levels of national productivity and economic growth. The "Statement of Principles of Quality of Worklife from the CWA/AT&T National Committee on Joint Working Conditions and Service Quality Improvement" reflects the involvement of union with business and industry in implementing these programs nationwide. Nationally, such groups involved in education and training as the American Association of Community and Junior Colleges, the American Society for Training and Development, and the American Vocational Association are each placing heavy emphasis on the areas of productivity and quality of worklife as real national forces to be studied and on which to act.

The major thrust of this portion of the monograph is to examine what business and industry is doing to improve human productivity/QWL. Purposely, this report does not concentrate on the use of technology as an intervention but rather focuses on the new more critical management practices being used. However, becuase technology and management practices do overlap and because of the significance of technology, a brief statement regarding technology is presented.

Indeed, technology, like new management practices, carries the potential for improving American productivity at a time when economic growth has been sluggish. The application of computer and microchip technologies, coupled with the enormous range and flexibility of developing telecommunications systems, offers a

potential for change that may be as profound as that caused by the Industrial Revolution. In manufacturing, computer-assisted manufacturing, computer-assisted design, and computer-assisted graphics are already playing an important role on the factory floor. At the same time, white-collar information handling is expanding enormously. In the service areas, both in the private and public sector, developments such as minicomputers, word processors, and automatic equipment, all linked by extensive telephone and satellite networks, are revamping the very way work places are designed and jobs themselves are defined (Auerback 1981). With $165 billion paid to clerical personnel last year, compared with the $600 billion for managers and professionals, the real savings to be gained by office-related technology will be in its application for the management and professional level person (Jacobs 1980). Activities such as seeking people, tracking down information, scheduling, travel, filing, and transcribing can all be processed through desk top microcomputers for the manager. Because of the ability of new technology to transer written materials and pictures over the telephone lines, traditional mail may soon be something of the past ("Japan Takes Over" 1981). Robotics is a vital part of this movement in high technology. Predictions that America would be covered with robots by 1980 did not happen because of the slower-than-anticipated development of the microprocessor and because the hourly cost for using a robot is actually in excess of the hourly rate for a traditional worker. However, with the wage spiral and the development of the inexpensive microprocessor, it is now estimated to cost five dollars per hour to run an average robot compared to fifteen to twenty

dollars per hour for a traditional worker. The American Society of Manufacturing Engineers predicts that by 1982 5 percent of all assembly systems will use robotic technology, by 1985, 20 percent of the labor force employed in the final assembly of automobiles will be replaced by automation, and by 1985, vision systems will provide enough feedback for robots to select parts scrambled in a bin. By 1988, 50 percent of the labor in small-component assembly will be replaced by automation, and by 1990, the development of sensory techniques will enable robots to approximate human capability in assembly. Currently, Japan has about 13,000 of the world's 17,500 robots. The United States has about 2,500 robots, and the remainder are found in the Western European countries (Dobb 1981). We are gathering momentum in the United States and as that momentum builds, we are going to make quantum leaps in factory automation (Speedup 1981).

The emphasis on technology will place unprecedented demands on corporations for retraining at all levels, including management (Russell 1981). The rate at which the change will occur will magnify the challenges ahead. Training and retraining for workers whose jobs will be directly affected by technology will be critical. Older employees will find it more difficult to adjust, and special provisions for their retraining will be necessary. Younger employees will need to be readied for the changes ahead. Underutilization of workers, displacement of workers, and unemployment of people because their skills have become obsolete will represent a massive challenge ahead.

Advances in technology are often cited as the major means of increasing productivity/QWL. However, as noted earlier, the use of new, more critical management practices represents even

a greater opportunity for gains in productivity/QWL. Because of the cost of the new technology, time needed for its development and implementation, tight money, and the reality that new technology will not necessarily impact on every job in the very near future. new management practices have decided advantages for fast implementation with quick return on investment. Presented next will be an overview of the many management practices that business and industry is using to improve productivity/QWL. The next several chapters will treat this subject in greater detail.

It is essential that training and occupational education decision makers have a knowledge of the new management concepts being used (Hopkins 1982).

Management practices to improve productivity/QWL have in many cases grown out of organization development (OD) theory and practice in the corporate world. Basically, OD represents a planned effort to improve the management of organizations (Patten and Vaill 1976). For the past twenty years, OD has been leading the way to improve organization effectiveness (Jamieson 1982).

A large variety of management practices have been and are being used to improve human productivity/QWL. Some have noted that new management practices seem to be developing everyday. A laundry list of some of those management practices might include: management by objectives, casual analysis, incentive systems such as the Scanlon Plan, cost-benefit analysis, work methods/measurement/simplication, lifelong employment, insight training, socio/technical theory, management development, improving work environment, communications strengthening, feedback systems, Gnatt and PERT Charts, time management. performance appraisal, productivity audits, decision making and problem solving, zero

based budgeting, role negotiating, and would be career development and planning, which allows employees to better understand career opportunities available within their organization and how to prepare and plan for horizontal and vertical career movement as well as helps the organization identify high potential employees, decrease their turnover, maximize their employee productivity, and ensure an adequate supply of talent ("Career Planning" 1982). Flextime, used extensively throughout Europe, is growing slowly in the United States as a method of giving workers more control over their working hours and reducing turnover, absenteeism, and grievances. Programs to promote individual worker wellness represent an effort to improve productivity by reducing health care costs for the company (Jacobs 1980b). Coaching is also an intervention that is being used. As a method of improving productivity this intervention allows subordinate workers to receive daily and weekly training from a superior who has been trained in coaching techniques. Ergonomics is a mechanical way of fitting the work, the tool, and the machine to the worker. It utilizes an interdisciplinary approach to fitting all these aspects together through engineering (Woolard 1981). Biomechanics is used to improve productivity by reducing the strain of the worker in lifting, sitting, and moving about ("Biomechanics" 1975). Employee participation reflects some of the Japanese models that are more flexible rather than the rigid hierarchies with which we are accustom (Burck 1981). This intervention recognizes the value of employees and involves them in the operation of the organization. Involvement varies from participation of employees on councils whose purpose it is to

improve the quality and quantity of services/products of an organization to participation in the ownership and management of the operation through stock options and positions on directing boards (Main 1981). Job redesign represents an effort to broaden the responsibility and influence of employees. It arranges in scope from adding a variety of additional tasks to and existing job to reduce boredom (Burck 1981) to designing jobs so that workers have greater control over their tools and processes for accomplishing tasks (Patten and Vaill 1976).

In summary, business and industry, the military, organized labor, and others are moving quickly to improve human productivity and quality of worklife. Both technology and management practices are being used to foster this development. What is apparent is that massive training and retraining of the existing work force will be needed for workers, supervisors, and lower level mid-management people if technology and management practices are to be developed and implemented in the shortest period of time. The implications for community and technical colleges in terms of their involvement in the national effort to retrain and upgrade America's work force are significant. The following chapter will identify the more critical management practices being used in industry to improve human productivity and quality of worklife in which postsecondary schools can assist in providing training. Training needed by workers, supervisors, and lower level mid-management personnel to implement and maintain these management practices will be identified.

What Critical Management Practices are Being Used

In this chapter, we will focus on those more critical management practices that are being used by business and industry to improve human productivity and quality of worklife. The purpose of this chapter is to help the reader understand what management practices are being used by business and industry that appear to be most important; and what training could be partially or totally delivered by community/technical colleges to train workers, supervisors, and lower level mid-management personnel to implement and maintain these management practices. As a result of studying this chapter, decision makers of occupational education and training will have a better understanding of those management practices that will be growing in use in the next few years and of the kinds of training that community and technical colleges can deliver to industry to help in the training of workers, supervisors, and lower level mid-management people to use these new, more critical management techniques.

Interestingly enough, increased productivity through better management of human resources may represent the number one opportunity for productivity improvement. Frequently, this is accomplished by default; that is, companies reach the point of diminishing returns with respect to substitution of machinery for people and therefore begin to work more effectively with their human resources (Sibson 1976). The Japanese have succeeded by paying close attention to managerial basics. They focus on the development of their human resources and emphasize employee development, group work, and job quality. The Japanese have

become a real competitor to the United States (Bryan 1982).

As noted earlier, the human capital economists reflect the same thinking that investing in people is at least equal to or better than investing in technology to improve productivity and quality of worklife. To be successful, according to Joji Arai, director, Japan Productivity Center, we in the United States will need to develop a new mentality that focuses on investing in people and a new management style that looks to people for the solutions to our problems rather than expecting great technological innovations to solve all the problems (Arai 1981). What we will need to do is to capitalize on the intelligence of employees. AT&T's chairman, Charles Brown, in his memo to the twenty-three Bell system operating companies, said, "We are dealing with nothing less than a new management style" (Burck 1981). Glenn Varney, president, Management Advisory Associates, Inc., believes that a truly major force for change in industry in the next few years will be the development of new styles of management (Varney 1981). Society has adopted more permissive attitudes in the last thirty years, workers have higher expectations from work, workers have less loyalty to their companies, education levels have increased, thus altering workers' expectations of what they should be allowed to do at work, and younger workers are increasingly demanding more involvement in the organization (Yankelovich 1979). With that backdrop, one can see the important role that new management practices will play in the years ahead as the United States begins to revitalize its industry to improve productivity and strengthen the economy.

This study sought to identify those management practices that appeared to be more critical to the success of improving productivity/QWL, and that schools could become involved in as training agents. The extensive list of management practices presented in the previous chapter was identified and reviewed, a review of the literature was conducted, both college and industry practitioners were consulted, and the National Telephone Reactors Committee was polled to determine the management practices that appear to be most critical. Identified for further extensive study were those management practices that, when implemented, require training which could be partially or totally delivered by community and technical colleges, which would touch the lives of the greatest number of workers, supervisors, and lower level mid-management personnel in the next ten years, and which were designed to impact on both productivity and QWL.

Two management practices were identified as most critical to meeting these criteria. They are: employee participation and job redesign. Table 1 reflects a small sample of the companies utilizing these practices. The rate of growth has been significant, and expectations are for rapid growth in the next ten years (Patten and Vaill 1976). To date, training for the development and implementation of these management practices has been greatly lacking (Vaughn 1981).

Both employer participation and job redesign practices are based on recognized theories of human resource management and motivation, experiences of other countries with plants in their native lands and in the U.S., and experiences of selected U.S. organizations operating in the United States. This section will present a brief overview of selected management theories that

support the two selected management practices highlighted in this study. As each management practice is detailed, examples of experiences of other countries and U.S.-based companies will be presented.

There are five theories of motivation and managment that can serve as the philosophical foundation on which employee participation and job redesign are based. One study in 1970 showed that of 300 companies surveyed, over 80 percent were moving from incentive-type approaches to the behavioral approaches to motivation that are described in this section. Conjecture is that the percentage is much higher today than in 1970. Abraham Maslow developed the hierarchy of needs approach to motivation. Basically, he felt that humans are wanting beings. There is always some need that they want to satisfy. Maslow indicates that humans are motivated by these needs as they perceive them. These needs urge individuals toward fulfillment and satisfaction. They drive individuals to certain types of behavior. The higher orders of needs become potent only after basic needs have been satisfied.

NEEDS HIERARCHY WITH THE LOWEST ASCENDING TO THE HIGHEST

Physiological needs. There are the needs for food, warmth, sleep, sex, and other primary bodily satisfactions.

Safety Needs. These include the need to be free from actual danger as well as the need for psychological assurance of security.

Love and belongingness needs. These are the basic needs for other people, social acceptance, and group membership, as well as the need to give and receive love and affection.

Esteem needs. These include the need to have the respect and esteem of others as well as the need for self-esteem.

Self-actualization needs. These are the needs to realize one's potential fully, to become what one is capable of becoming, and to actualize the real "self," which is more than the basic organism (Rush 1976).

Maslow emphasizes that after a need is satisfield, it is no longer a motivator of behavior for the individual. As the needs of one level are reasonably well met, the worker will strive to satisfy higher level ones. These needs overlap and interact. Workers needs for satisfaction is insatiable because needs never end. The lower level needs are more demanding, but those higher on the scale are more lasting and effective motivators (Mali 1978). The key to motivation lies in giving people an opportunity to satisfy their upper level needs, rather than the lower level ones, which most employees have already satisfied. Worker participation and job redesign represent an attempt to provide employees with an opportunity to meet their needs in the upper level areas.

Douglas McGregor developed what is often called the Theory X and Theory Y approach to motivation and management. Basically, he developed two sets of contrasting assumptions about humans and their perceptions about work. These assumptions become determinants of leadership style and motivation of people.

THEORY X ASSUMPTIONS

1. Workers inherently dislike work and when possible, avoid it.
2. Workers have little ambition, shun responsibility, and prefer direction.

3. Workers want security.

4. Workers have to be coerced, controlled, and threatened in order to attain organizational objectives.

THEORY Y ASSUMPTIONS

1. Workers seek responsibility when conditions are favorable.

2. Workers want to direct and control their own commitments.

3. Workers want rewards commensurate with their commitment.

4. Workers want opportunities to make significant contributions to organizations objectives (Mali 1978).

McGregor points out that to a large extent whether people are perceived to have potential and whether they develop is based on the way people are managed. He feels that we simply have not learned enough about utilization of talent, and therefore, if we select the best people available for specific jobs, we still may not use employees to their full potential. He feels an organizational climate conducive to human growth is reflected in Theory Y. He believes the real problem is that many of our assumptions about workers are erroneous and that workers have far more potential and want to contribute a great deal more than the traditional manager assumes. He feels some organizations could double their effectiveness if they could tap the unrealized potential present in their human resource (McGregor 1960). To motivate workers, managers will need a set of attitudes about people and about the environment that is best for advancing goals of people and of the organization. Both employee participation and job redesign are partially based on this theory.

Fredrick Herzberg developed what is called the motivation-hygiene theory. Basically, he identifies job elements that generate positive feelings (satisfiers) and those that generate negative feelings (dissatisfiers). Satisfaction and dissatisfaction are separate factors, not endpoints on a continuum. Satisfiers are also called motivators because they are effective in motivating employees to greater productivity. Dissatisfiers are called hygiene because they prevent dissatisfaction from occurring but do not induce people toward extra effort. Five job conditions that stand out as high determinants of satisfaction are: achievement, recognition, work itself, responsibility, and advancement.

Herzberg claims that these satisfiers can motivate individuals to long-term superior performance and effort. He also identifies job conditions that stand out as high determinants of dissatisfaction. indicating that they may produce change in attitude and productivity, but they are only short term in nature. Dissatisfier factors are organizational policy, administration, supervision, salary, interpersonal relations, job security, and working conditions. Herzberg argues that some managers tend to create stressed environmental conditions (dissatisfiers) while ignoring the potential value of satisfier factors. He feels that satisfier factors should be built into the job content itself. Workers who have enriched job content will express satisfaction both in their feelings, performance, and attendance. The concept is that to become more productive and competitive, a company should consider stressing worker participation and job redesign. These allow the worker to experience greater satisfaction and the employer to improve chances for increased productivity. He believes that the work

ethic is not necessarily dead but rather that jobs need to be redesigned to give people an opportunity to meet their needs. To motivate, then, is to give workers motivators within the job content that will lead to satisfaction for the worker and increased productivity for the employer. Again, employee participation and job redesign are reflective of much of this theory (Herzberg 1959; Mali 1978).

A newer theory regarding the motivation of employees also impacts upon both employee participation and job redesign. As it is presented by Williams Ouchi in his book, "Theory Z." Basically, Dr. Ouchi has compared Japanese and American companies. The ingredients he found in Japanese organizations that contribute to an effective organization for both the employer and employee consist of: lifetime employment, slow evaluation and promotion, nonspecialized career paths, implicit control mechanisms, collective decision making, collective responsibility, and holist concern for the individual. He found that American companies seemed to believe in just the opposite: short-term employment, rapid evaluation and promotion, specialized career paths, explicit control mechanisms, individual decision making, individual responsibility, and segmented concern for the economic aspects of the individual's life only. Therefore, in Japan the attention is on the long-term good, collective participation, and the worth of the individual. Interestingly enough, he found some organizations in the United States that are successful which seem to mirror that same Japanese management style. Such companies include IBM, Procter & Gamble, Eastman Kodak, the U.S. military, and Hewlett-Packard. The emphais of this theory

is on the involvement of the workers as the key to the success of an organization. Workers want and need involvement and when given an opportunity can become effective participants and the key resource of the organization. The emerging emphasis in the United States on employee participation and job redesign is founded on the experiences of some of the companies listed and the experience of the Japanese management style (Ouchi 1981). In "The Art of Japanese Management." Dr. Pascale identifies what he considers the seven important management practices essential for successful organization based on employee involvement and motivation (Pascale 1981).

Based on the theories persented above, on the experience of such foreign countries as Japan, France, Germany, Sweden, and the Netherlands, as well as on the experiences of selected companies in the United States, the motivation to use employee participation and the redesigning of jobs should be overwhelming. This chapter has focused on the need for examining management practices and the related training needs as crucial factors in improving productivity and the economy. In addition, this chapter has identified the two more critical management practices that have implications for training through postsecondary occupational education. It has also presented the theory and evidence that support these two more critical management practices in terms of content, structure, and scope. Next the training needs for each management practice will be identified.

Delivering Training for Job Redesign

The next two units will help the reader gain a good understanding of the two more critical management practices identified in this report: job redesign and employee participation. For each of these critical management practices, a descriptive explanation will be presented. Also presented for each practice will be a definition, the theory or theories that support the practice, the component parts, scope, impact on productivity/QWL, and the training needed for successful adoption. Job redesign will be presented first.

Job redesign, in its broadest sense, is attracting and will continue to attract greater attention as an effective process to improve both human productivity and quality of worklife (Katzell 1975). Job redesign has the potential for being an important cornerstone for an entirely new style of organizational management. One of the most significant ways to develop organizations is to redesign and restructure the work itself (Etzioni 1980). It has been widely recognized that a key to improving life in organizations is to find ways to make work meaningful and challenging. Job redesign puts work and fun at the same ends of the pole, and allows increased productivity to go hand in hand with both improved worker satisfaction and growth (Hackman and Oldham 1980). Job redesign looks at the jobs within the classifications of workers from the production line to the executive office. As Douglas McGregor wrote "The capacities of the average human being for creativity, for growth, for collaboration, for productivity (in the fullest sense of the term) are far greater than we have recognized..." (McGregor 1960).

One of the major influences on organizational productivity is the quality of relationship between the person and the job they perform. Job redesign improves productivity and quality of worklife by focusing on the people who do the productive work of the company (Hackman and Oldham 1980). The reindustrialization of America, aimed at improving productivity/QWL, will develop more efficient producers, processes, and equipment. It will necessitate job redesign on a scale not approached since World War II (Evans 1981). Dr. C. Jackson Grayson, chairman of the American Productivity Center, believes that as we strive to improve productivity/QWL we should learn from Sweden and Japan and their efforts to redesign jobs. He cites General Motors' program to involve employees in the design of the job as having been very successful (Waldman).

Very conservative estimates of persons who believe that present job arrangements are satisfactory are that 20 percent (or 20 million), of our current jobs could be substantially improved through job redesign. Others believe that over 80 percent of the existing jobs in America (or 80 million jobs), could be improved (Hackman 1980).

Job redesign focuses squarely on the actual work that people perform in organizations. It is an effort to enhance worker motivation by increasing the levels of responsibility, meaningfulness, and feedback (Kirby 1977; Parsons 1978) that are built into jobs (Hackman and Oldham 1980). Herzberg would expand this list to include respect, responsibility, recognition, challenge, personal growth, and learning opportunities (Herzberg, Mausner, and Snyder 1959). Principles that are used in implementing

work redesign include combining tasks, forming natural work units, establishing client relationships, vertically "loading" the job, and opening feedback channels (Hackman 1981). Job redesign focuses on the structuring and restructuring of both the job's process and procedure with tasks and duties. It examines how a job is developed, arranged, executed, measured, and controlled (Mali 1978). Of importance is the concept of increasing the discretionary judgment of the worker over as many aspects of the related tasks and duties associated with the job as possible (Mali 1978). One comprehensive study of worker productivity and job satisfaction found that where these principles are followed, both job satisfaction and productivity improve (Katzell 1975).

Expected outcomes of job redesign include high internal work motivation, high "growth" satisfaction, high general job satisfaction, and high work effectiveness. Job redesign at its best improves the quality of worklife for the employee by meeting the employee's psychological needs for meaningful and responsible work with feedback. It has the potential of reducing absenteeism, tardiness, turnover, and grievances. Work effectiveness is improved by increasing both the quality and quantity of goods and services produced. Some also feel that the problems of sabotage, theft, and deliberately low productivity levels are all improved (Hackman and Oldham 1980; Herzberg 1959).

Theorists most recognized for their work in job redesign are Frederick Herzberg and the team of J. Richard Hackman and Greg R. Oldham (Katzell 1975; Dowling and Sryles 1978). Herzberg's work is summarized in the preceding chapter. His

theory proposes that the primary determinants of employee satisfaction are factors intrinsic to the work that is done, namely: recognition, achievement, responsibility, advancement, and personal growth and competence. He believes that a job will enhance work motivation only to the degree that motivators are designed into the work. Studies that he performed on sixteen different work groups (Rush 1976), particularly with the Air Force, demonstrate that job enrichment can lead to beneficial outcomes both for the individuals and for the employing organization.

Hackman and Oldham also present a behavioral approach called Job Characteristic Theory that focuses on the objective characteristics of employee jobs. The basic idea is to build into jobs those attributes that create conditions for high work motivation, satisfaction, and performance. In addition, the approach acknowledges that people will respond differently to the same job. Therefore, the theory requires that the characteristics of job holders, as well as of the jobs, be considered when work is designed (Hackman and Oldham 1980). Katzell, in Worker Productivity and Job Satisfaction, presents an examination of all major theories reported during the past twenty years and an analysis of over forty studies done on the effectiveness of job redesign (Katzell 1975). The positive results of applying these theories at Volvo, AT&T, and GM are cited frequently (Moore and Moore 1981).

To avoid any misunderstanding and ambiguity for the reader, it should be noted that job redesign is often used as a rubric encompassing such areas as job enrichment, orthodox job enrichment, job enhancement, and job enlargement. This section will present a brief description of each category. However, it should be

noted in this paper that job redesign most frequently refers to the refashioning of the job itself, creative worker autonomy, more democracy in the workplace, feedback, responsibility, and meaningfulness of the job.

Job Enrichment. This concept is defined as the change in the content or activities of a job in a manner that increased its level of responsibility, challenge, meaningfulness, and so on, with the object of making it intrinsically more satisfying and motivating to the worker (Katzell 1975). The theory was popularized by M. Scott Myers (Hodgetts 1977).

Orthodox Job Enrichment. Orthodox job enrichment (OJE) is a program of job redesign based upon the motivation theories of Dr. Frederick Herzberg. It is a strategy for improving both quality of worklife and enhancing productivity. It redesigns jobs to enable the worker to achieve satisfaction through performance. It also involves vertical job "loading" by building motivators into the job and by redelegating some of the planning and controlling aspects, as well as the "doing" of the job.

Job Enhancement. A term that is less commonly used, but that is assumed to be interchangeable with either job enrichment or orthodox job enrichment.

Job Enlargement. Horizontal job "loading" or restructuring is often used to permit job responsibilities and duties to be interchanged and rotated among peers or similar job classifications. Work content is expanded in size, length, or volume for interest purposes (Mali 1978). Some persons distinguish this concept from job enrichment by noting that job enrichment emphasizes challenge more than diversity (Katzell).

Job Islands. A job design style that allows for teams of three to seven people to work on assignments that take longer to do and are more complex than traditionally found on assembly lines. The benefits of this system are that it relieves boredom, permits socializing, allows cycling of job assignments, and improves the quality of worklife for the workers. Though not common in the U.S., it is used frequently in West Germany (Moving 1981).

Job redesign by its nature necessitates significant training. Massive job redesign that, when implemented, impacts upon practically all jobs in all worker classifications within an organization will require retraining and upgrading of skills for practically the entire work force. Critical to any job redesign is the skill variety that is added to a job to improve the meaningfulness of the work. Redesigned jobs are so organized as to challenge or stretch the skills and knowledge of workers so that they experience meaningfulness in their work. Therefore, for people to feel comfortable in the redesigned job, it is essential that the workers be trained in the high skill/knowledge competencies needed for a particular job. People who are not competent enough to perform well will experience a good deal of unhappiness and frustration at work--simply because the job "counts" for them and they do poorly at it Because people become so involved in their work under job redesign, the psychological cost of not being able to perform are high. Therefore, well planned and executed training is essential for both the people and for the effectiveness of the work itself. Unfortunately, the importance of this training is often overlooked.

In particular, two types of training are required for job redesign. The first, technical training. It ensures that employees have the knowledge and skills necessary to execute their enriched tasks competently. If work design has been successful, employees will have an increased commitment to good performance. A good technical training program for employees on enriched jobs can increase the likelihood that their work experiences are characterized by self-reward rather than by frustration.

The second type of training that is often needed when work is redesigned has to do with the management of interpersonal relationships and decision-making processes. Under traditional job designs, employees have little need to coordinate and negotiate with others to get their work done or to make decisions about the work processes or scheduling. However, under job enrichment, a great deal of decision making and coordination may be required. The prior work experiences of the employees may have provided them with few chances to exercise or hone their skills in carrying out such activities. Problems may develop because of insufficient knowledge and skill about how to manage one's new and expanded work responsibilities (Hackman and Oldham 1980).

The Chevrolet Motor Division of General Motors in Dayton, Ohio is an example of the emphasis that industry is placing on providing the employees with training when their jobs have been changed. As the plant was reopened with newly designed jobs, returning employees were provided with forty to sixty hours of training. A portion of that training acquainted the workers with the job redesign concept and provided the workers

with any new knowledge or skills they would need under their job's new structure. Training was provided to virtually all employees at all levels (Hiegel 1982).

The literature consistently reflects the notion that job redesign requires employees at all classification levels to receive training prior to its implementation (Peterson and Duffany 1976). The training must be tailored to meet the needs of the particular organization. It varies in degree of depth depending upon the extent of the job redesign, how technical those jobs have become, and how much interaction with others the jobs involve, and how much responsibility is given to the worker.

Because job redesign and employee/group participation management practices both have many similar aspects, it becomes obvious that training practices for both management and labor are similar and overlapping. Yet in the process of training and educating people, it is necessary to understand that the exact training needs of each organization will vary. Before training begins, however, the persons responsible for this education and training will need a background on both job redesign and the training needs that typically develop as a result of job redesign in order to effectively assist in delivering the training to the employees.

Though a significant amount of literature has been written regarding job redesign, little detailed accounts exist for the specific training that is required for job redesign implementation. Presented below is an approach to job redesign for persons at the level of worker, supervisor, and lower level mid-management. These training needs were identified from numerous sources in

the literature, personal interviews, and personal observation. They are by no means complete. Instead they are rather general in nature, and must be customized to fit the needs of a particular organization.

Training Needs for Job Redesign

Employee Orientation Training

One of the most important elements of successful job redesign is properly preparing the workers for it. Prior to implementation of the new job design, workers need to know what job design is, why the company is installing it, how it will redesign the work, and what job redesign means for the company and for the workers themselves (Hiegel 1982; Morse 1982). It is important for them to understand the basic philosophy, principles, and techniques involved in job redesign. Workers will want to understand and experience the company's commitment to the new practice, and they will want to know where and why problems might be expected. Finally, workers will need to know that they will receive retraining, and what kind of training that will entail. An orientation period providing this kind of information can give workers an opportunity to defuse their fears, and is vital in motivating them to accept and--it is hoped--become enthusiastic about the job redesign.

Employee Technical and/or Scientific Skill Development

Workers whose jobs are redesigned may need additional skills and knowledge in some of the following areas: (1) new manufacturing or support services processes; (2) the operation and maintenance of tools and equipment; (3) background information about unfamiliar products or services with which the worker will now be involved;

(4) techniques for improving work efficiency in order to comply with or exceed standards; and (5) approaches for measuring, controlling, and making corrections related to quality and quantity of output. Workers may also need applied statistics and analytical skills to help them gauge the impact their efforts have on improving productivity.

These skills areas come from the technical disciplines, including manufacturing, quality control, industrial engineering, and business. The greater the understanding and level of skill, the more significant the workers' satisfaction will be, and the more satisfied workers are, the more likely it is that the company will realize added productivity through employee contribution.

Employee Communications and Basic Skill Development

Job redesign often increases the level of communication, responsibility, and scientific or technical knowledge needed by a worker. As a result, such workers may need additional training in the following areas: (1) basic applied skills in technical reading, writing, and mathematics; (2) planning, organizing, and scheduling work; (3) solving problems, setting goals, and making decisions about the use of resources (Hodgetts 1977; Ives 1976); (4) creative thinking; and (5) for selected workers, training to enable them to become self-supervising. Basic computer literacy may also be needed (Miller 1982).

If the job redesign involves group work or frequent interaction with other workers, training in group process, developing trust, and self-understanding may be critical. Verbal and nonverbal commications, conflict resolution, and reaching consensus are particularly relevant to the interpersonal relationships so critical in teamwork and in giving and receiving information

necessary to perform many job tasks. Some employees may need training in leadership or team-facilitation skills. Finally, some may make excellent use of assertiveness training to help them speak up and take risks--both of which can be vital to improving productivity.

Additional skill development needs are given later in the paper, in the section on employee participation.

Supervisor Training Needs

Supervisors at all levels need to understand and become involved in job redesign in order to make it work for their company. When job redesign efforts fail, it is often because the supervisory staff lacks the understanding, commitment, and training needed (Wright 1982). Perhaps no other group needs the extent of training that supervisors need, because when supervisory staff are not trained to mesh their decisions and actions to the new responsibilities and increased autonomy of the workers whose jobs have been redesigned, worker satisfaction plummets and so does productivity.

The roles of supervisors in a job redesign situation are many and diverse. They may include (1) gathering data for charting trends and forecasts in work volume and work force needs; (2) training employees in their new responsibilities and counselling them about work-related problems and career opportunities; (3) helping subordinates set performance goals and reviewing with them their performance in attaining those goals; (4) providing increased openness of communication, both upward (sharing employee concerns and ideas with higher management) and downward (sharing information about organizational objectives and policies with employees); (5) working with subordinates to develop and test

innovations and procedures for executing and coordinating work; (6) modifying, where possible, aspects of the work contex (e.g., compensation and control systems, opportunity structures, equipment, space, lighting, and so forth) that may be impeding employees' work or satisfaction; and (7) managing the evolution of the job enrichment process itself. All of these responsibilities may require training in skills that the supervisors may not have acquired previously, and all of these skills could be developed through training delivered by community or technical colleges in cooperation with the company.

Supervisor Orientation Training

Like other employees, supervisors will need a basic orientation to the system of job redesign. They will need a thorough understanding of the philosophy, principles, and techniques of job redesign. Further, their orientation should include not only what supervisors need to know for their own roles, but also what employees are taught in their orientation training.

Supervisor Technical and/or Scientific Skill Development

Beyond an orientation to job redesign in their own jobs, supervisors will need a detailed background in the theory and practices of job redesign as expressed by Herzberg, Hackman and Oldham, and other experts in the area. Supervisors will also need to understand how the theories are applied to the management of people. Critical to supervisors' roles in job redesign situations is knowing specifically how to redesign jobs, what the key components are to a quality job, and how to evaluate the effectiveness of job redesign. The Air Force has forty to sixty-hour training program on these concepts. Almost as important, supervisors will need training in the new and rather different supervisory skills

needed in job redesign situations, specifically in (1) applying new leadership styles; (2) making better decisions that benefit the employees as well as the company; (3) resolving conflicts in job redesign situations; (4) delegating responsibilities; (5) coaching, reinforcing, and maintaining the self-esteem and good performance of workers; (6) empathizing with and supporting subordinates without removing their responsibility for action.

As mentioned earlier, supervisors may need to acquire technical and other skills realted to gatering data, training employees, helping set goals, and so forth. For example, job enrichment calls for employees to address and solve higher level problems. What this means, in turn, is that the problems the workers cannot solve themselves will be problems of an even higher level, and these will be the ones now brought to the supervisors. Because of this, supervisors will need scientific and technical training at higher levels in such areas as (1) equipment maintenance and operation; (2) efficient work processes and procedures; and (3) maintaining and measuring both quality and quantity of work. Advanced skills in business, such as scheduling, budgeting, and calculating cost-effectiveness, may be needed.

Supervisor Communications and Basic Related Skill Development

Because of the challenges presented by job redesign, supervisors are likely to need more training in technical report writing, reading, and mathematics or measuring skills. In addition, skills in listening, making presentations, and pinpointing and asking the right questions could be vital (Wright Patterson 1982).

In the area of interpersonal skills, verbal and nonverbal communications skills as well as self-understanding and empathy skills, may need to be sharpened. Skills in reinforcement and effective feedback may be essential as the give-and-take with subordinates increases under job redesign. Depending on the structure of the redesign, supervisors may need added skills in group processes, leadership skills, and team facilitation (Morse 1982). Other skills are listed in the next section under Employee Participation.

Lower Level Mid-Management
Personnel Orientation

These lower level managers are those to whom first-line supervisors typically report. These managers will need specific information to help them understand job redesign so they can effectively participate in redesigning the jobs of their first-line supervisory staff, as well as helping those supervisors redesign the jobs of the workers. They will need the same background in the philosophy, principles, and techniques of job design as the supervisors.

Lower Level Mid-Management
Technical and/or Scientific Training

Lower level managers may need advanced training in decision making, problem solving, and conflict resolution as they apply to job redesign situations. They will need to learn ways of applying new leadership styles made necessary by job redesign, including skills in delegating tasks and responsibilities, coaching, reinforcing workers and first-line supervisors, maintaining and enhancing self-esteem of their subordinates (appropriate models would also be useful here), and empathizing and providing support

for subordinates without removing responsibility for action (Wright Patterson 1982). They should become well grounded in the management theories of Herzberg, Maslow, McGregor, and others, including "Theory Z" ideas (Bodek 1981). Managers may not need to acquire the detailed training in operations that first-line supervisors should have, but in some areas managers may need technical training at equivalent or advanced levels.

Lower Level Mid-Management
Communications and Basic Skill Development

Job redesign in a company will demand new levels of communication among managers, first-line supervisors, and employees. Many lower to mid-level managers will need training to help sharpen their skills in understanding themselves and others, and in effective verbal and nonverbal communication. Skill in reinforcement and in providing appropriate feedback may be essential. Depending on how jobs are restructured, the managers may need to acquire skills in group processes, as well as in leadership and team facilitation (Morse 1982). (Additional skills are listed in the next section under Employee Participation.)

Employee Participation Training Needs

Quietly, almost without notice, a new management practice is being incorporated into organizations throughout our country to improve both productivity and quality of work life. This new management practice is sometimes called employee participation. Although the management practices of the 1930s and 1940s still dominate the organizational scene (with emphasis on hand work rather than utilizing the total mental capacity of the worker), a new management style is taking root. The participative process of management practice is steadily changing the more traditional

top-to-bottom hierarchical form of decision making (Moving Beyond 1981). Interestingly, foreign observers of our scene such as Dr. Fukuda, winner of the 1978 Deming Prize for quality control improvement, believes that the participation of U.S. workers in the production and decision making process of U.S. organizations will be the key to success for America's efforts to improve human productivity and quality of work life (Fukuda 1981).

Sidney Harman, former undersecretary of the U.S. Department of Commerce, believes the human beings and their mind resources represent a resource that is as important or more important to our country and our efforts to improve productivity/QWL as is technology. The underlying principles behind the expanding effort toward the management practice of employee participation is that workers both in the private and public sector are a virtually untapped natural source of ingenuity and enthusiasm. This ingenuity can be put to work when workers at all levels are able to participate in decisions made on the shop floor, in the office, in the hospital, or wherever.

According to James Auerback, educational representative of the AFL-CIO, workers produce more and at a better quality and enjoy a greater quality of work life when they have a sense of creative involvement in their work; when they feel that what they do is relevant and that it serves a useful purpose; and their work is appreciated (Auerbach 1981). This new management practice emphasizes the notion that <u>people</u> are an organizations's most valuable investment--they are not feudal "pawn" (Noll and Oberwise 1982). The effort is to more completely utilize the resources of employees who away from their jobs hold responsible positions in their communities, village boards, school boards,

fire departments, and churches as well as family responsibilities. The real success of the American free enterprise system may well lie in our ability to tap these resources and to continue to extend democratic principles to the shop floor in order to effectively capitalize on the employees' ability to contribute directly to the success of the enterprise (Noll and Oberwise, Moore and Ross 1978). Supporting this belief are studies that indicate that employee participation will result in greater accomplishments. Paul Axtell, training manager for the Monsanto Corporation, believes the benefits for the worker will be growth, satisfaction, self-esteem, removal of job obstacles, flexibility, and job security. For management, the rewards will be leverage on costs of goods, reduction of problems cooperation, more productive work time, and new ideas (Axtell 1981).

A lot of reasons have been given for the new thrust toward employee participation. However, the more significant reasons include (1) the recognition of employee participation as an effective management practice for improving productivity and quality of work life--thus providing business and industry with an opportunity to be more competitive in the foreign markets; (2) to preserve jobs and to contribute to the economic stability of the United States; (3) the higher expectations for participation by employees; (4) the higher educational attainment levels of employees; (5) the increased complexity of technology in both the office and factory--developments that require additional employee interaction and participation.

One recent study indicated that 56 percent of the workers polled feel they have a right to participate in decisions affecting their jobs. As work becomes more technical and people become

more job specialized, employee participation and interaction becomes more of a necessity (Rosow 1974; Lippitt 1969). Employees at all levels are in day-to-day contact with the processes and procedures that ultimately determine the quality and quantity of the goods and services they produce. Given the opportunity, employees can spot and correct situations where improvement is needed or identify where resources are being wasted (Simper 1981). A final reason being mentioned more frequently at workshops and in literature on the topic includes the effort to more completely move the democratic process in which people function on a day-to-day basis outside the job into the worksetting (Landen 1981).

Employee participation will be defined later. However, at this point it is enough to say that employee participation provides employees the opportunity to provide direct input in the development, implementation, and decision making processes of the business. The level and extent of this involvement depends upon local situations. Paul Chaisson, Director of Human Resources at Malden Mills, notes that "there's no longer management turf and worker turf, there's just a sharing of management of the business and there's such a thirst among the workers for this process, it's amazing" (New 1981; Noll and Oberwise 1982). Described in narrow terms, individual employees become involved in the decision that impact directly upon their work area. In the broader sense there becomes a "sharing of the turf." In this arrangement, participation extends into strategies for improving the treatment of working people as well as the production side of the operation (Auerbach 1981).

The research on the success of employee participation, although limited because of the lack of truly controlled studies

in industry, is posititve (Katzell 1975). Employee participation in decision making on the shop floor, in the office, and in the boardroom has repeatedly had its effectiveness documented in Western European countries such as Norway, Sweden, France, The Netherlands, West Germany, and the United Kingdom (Rosow 1974). Comparative studies between the United States and Japan repeatedly attest to the strengths of employee participation over traditional management practices (Pascale 1981) Specific case studies of employee participation as used in Japan and the success of this management practice seem endless. Repeatedly, in Japanese organizations improved human productivity and quality of work life has been caused primarily by increase employee participation (Fukuda 1981).

Experiences of U.S. companies are increasingly supporting the advantages of employee participation as a viable management practice for improving human productivity/QWL. Research studies conducted on projects to encourage greater employee participation in decision making, while insuring all employees are treated fairly, allowed the opportunity to develop their capabilities to their fullest, and provided with an opportunity to share in the gains of the company indicate the effectiveness of the management practice. Companies such as Procter and Gamble, Herman Miller, General Motors, IBM, Polaroid, 3M, Hewlett-Packard, Midland-Ross, Xerox Corporation, and other companies are repeatedly testifying to the impact that employee participation can have. Case study after case study presenting the success of American companies in utilizing American employees through participative management to gain greater productivity levels and higher quality of work

life for the workers is being identified (Ouchi 1981; Moore and Ross 1978; New Industrial 1981; Dowling and Sryles 1978).

The trend is clear. The evidence that organizations can meet their twin goals of increasing job satisfaction (QWL) and improving both the quality and quantity of production through worker participation is growing. Concerned executives and serious students of the free enterprise system are recognizing that something must be done (and done quickly) to meet the needs of both the free enterprise system for increased productivity and of the individual for improved quality of work life. Fortunately for a great many organizations, the answer is already available. For those with the courage and the vision to take the necessary steps there is a way to meet both needs. The one frontier left to industry (in essence, the one untapped resource), is the knowledge that lies within our own employees--knowledge that is accessible through worker participation (Moore and Ross 1978).

The changes in management practices to improve productivity/QWL are underway and may be massive beyond imagination. An increasing number of companies and unions are leading a march away from the old, crude workplace beliefs and the adversarial relationship it spawns. Given this trend, the current work psychology will soon have traveled almost full circle from where it was only thirty-five years ago (New Industry 1981). Yet today there is still only a small percentage of the total U.S industry that has "caught on" and has implemented the employee participation management practice. In light of this fact, the potential for the number of persons who will need training and retraining for this new management practice counts in the millions (Crosby 1981).

Employee participation is a loose term that conjures up

many definitions. In reality, it is more than a term more than a plan. It is a concept. Employee participation is worker involvement in management type activities: planning, problem solving, decision making, and self-supervision (Axtell 1981). In the process, the employee is permitted to influence activities, but management gives up neither authority nor responsibility for the results. The difference between employee participation and delegative management is that employee participation permits people to be involved in the work. Delagative management goes one step further by expecting people to be involved.

Employee participation can be viewed as a mechanism that encourages participation. It is an effort where management recognizes the dignity and worth of every individual regardless of what his or her job may be. It is a way both to fulfill worker requirements and meet the needs of the organization in the critical areas of productivity and quality (Moore and Ross 1978). Employee participation may be viewed as a few employees occasionally giving minor suggestions for productivity improvement to autonomus work groups. However, typically the system allows small groups of workers to come together voluntarily to focus on areas of concern. Reinforcement, feedback, recognition, and training are provided the participating employees. Frequently, employees involved in participation kinds of arrangements receive a great deal of recognition for their achievements, participate in some kind of economic gain sharing, are provided job security against being laid off, are involved in developing strategies to retain employees during hard times, and are given the opportunity to be involved in work simplification studies.

Dr. Delmar Landen, director of Organizational Research and

Development for General Motors Corporation and a nationally recognized authority on quality of work life and productivity intervention, believes that employee participation management practices can have a number of expected outcomes. Several of the expected outcomes noted in the implementation of employee participation at General Motors and their related research include reductions in the amount of wasted material, redo work, overtime, absenteeism, dissatisfaction, and employee grievances. Improvements, in the same studies, have consistently been shown in the efficiency of work process, and in the quality and guantity of goods and services produced. Employee worker satisfaction has improved with employees expressing feelings of greater responsibility, respect, recognition, meaningfulness in their work, challenge in their work, and opportunity for growth (Landen 1981). Studies cited by the AFL/CIO include the same outcomes as mentioned above but in addition, they have noted less trips by employees to health centers during worktime. A national research study conducted to examine the benefits of employee participation and other new management practices substantiates the fact that workers who have more influence over what goes on in their jobs, have a generally more favorable attitude about their jobs. Also, employee participation practices have been found to be more conducive to better productivity (Katzell 1975).

A large base of theoretical research and actual case studies is supportive of employee participation as a viable management practice. The experience of U.S. companies and numerous foreign countries attesting to the value of employee participation was cited earlier. However, there is still a common misconception in the United States that the theories behind employee participation have been imported from Japan. This could not be

further from the truth. American psychologists have led the way in research in motivational theory, alienation, the impact of different management styles and practices, and the need for--or lack of--clearly delineated hierarchies to make things work. In the earlier unit, "What Critical Management Practices are Being Used" the major related theories are explained in some detail.

In brief, Abraham Maslow developed what is called the "hierarchy of needs" theory which states that an individual's primary needs such as food and shelter, take precedence over emotional needs. But as each primary need is fulfilled, Maslow theorized, subtler needs such as self-esteem and self-actualization rise to the surface (Rush 1976). Maslow's theory points out that when wages are largely high enough to fill basic needs, regular raises do not satisfy the need for involvement and fulfillment in the job. Douglas McGregor developed the famous "Theory X versus Theory Y" concepts of management and was among the first to suggest practical applications of other theories. He claimed old-line Theory X managers--those who believe that people inherently dislike work and must be ordered to do it--are not as effective as Theory Y managers, who believe that people want to work and who encourage that basic desire through trust and cooperation. He was one of the first to stress the importance of small working groups (McGregor 1960). Additionally, William Ouchi, developed what he called "Theory Z" (Ouchi 1981). In essence, this theory is based on Japanese-style concepts of long-term employment and employee participation in decision making. His study was a comparison between American and Japanese styles of management. Research by others such as Fredrick Herzberg and Richard Pascale continues the same theme of meeting the needs

of employees for recognition, respect, meaningfullness of work, and challenge through employee participation in the organization (Herzberg, Mausner, and Snyderman 1959; Pascale and Althos 1981).

Employee participation as a management practice takes many different forms in business and industry. Predominantly, organizations express the employee participation concept through group and teamwork arrangements for the purpose of increasing human productivity/QWL. General Motors calls their employee participation program Employee Participation Groups; Ford Motor Company calls their effort Employee Involvement; Control Data uses the term Involvement Teams and Herzberg refers to Democratic Participation Groups. Other terms used in business and industry include: Worker Participation Groups, Quality Circles, Problem Solving Meetings, Teams, and Zero Defect Groups. Additional terms referring to the basic concept include: Improvement Groups, Quasi-Industrial Engineering Teams, Involvement, and Performance Circles. Some organizations use such terms as: Study Groups, Scanlon Plan, Gains Sharing, Delegative Management, Individual Involement, Safety Teams, Productivity Improvement Committees, Open Systems Management, Profit Improvement Teams, and Bottoms-Up Management. Interestingly, not only do companies use different names but each company has its own special twist for its organization's use of employee participation. Consequently, each organization has its specific needs for training of workers, supervisors, and lower levels of mid-management.

In the next section an analysis of the kinds of training needed by such people in the implementation and maintenance of an employee

participation program will be provided. Obviously, for each company the specific training needs will be different.

Training in the management practice of employee participation is essential for growth in the United States because to grow, the development of original ideas is essential (Fukuda 1981). The essence of employee participation is that those new ideas lie in the unused talents of the workers (Axtell 1981). Our dedication to these principles will need a total commitment to the comprehensive training of all employees in not only the technical aspects of their jobs, but also in the job content and managerial aspects of each of their assignments. We will need to reflect the dedication of the Japanese to this concept (Crosby 1981). For example, the average Japanese employee during their first ten years of employment can expect in excess of 500 days of training (Ouchi 1981).

Already, significant trends exist toward massive training for employee participation in the United States. The Air Force Logistics Command, Honeywell Corporation, and the Westinghouse Corporation each have in excess of two hundred employee participation groups in force. Though Japan has in excess of one million employee participation groups and American organizations are just beginning in this direction, the future for expansion of this concept seems great.

Research done by the International Association of Quality Circles (IAQC) of numerous firms who have implemented employee participation management practices indicate that serious need exists for training at all levels for the implementation of those management practices. In many firms surveyed, surprising little attention has been given to the kinds of training needed in order to fully utilize the new management practice of employee participation (Vaughn and Whelan 1981).

It is generally agreed that employees, supervisors, and managers who are to be involved in employee participation management practices will need training in several broad areas. Those broad areas include an orientation to the new management practice, technical and quasi-scientific training as it relates to their job content, management skills needed to perform their job, measurement skills for measuring quality and quantity of work, and broad skills in communications and group interaction (Landen 1981; Moore and Ross 1980; Crosby 1981). The next portion of this unit will present specifically the kinds of skills that need to be developed for employees, supervisors, and lower level mid-management personnel for successful implementation and maintenance of employee participation. Noted should be the similarities between the training needed for employee participation program implementation and the training needs cited earlier for job redesign implementation. The training needs analysis presented is by design broad and general--realizing that for any particular company, a specific customized training program would need to be developed. Interestingly, most of the skills listed represent the kinds of training which could be delivered through a community or technical college.

Employee Participation Training Needs

Employee Orientation Training Needs

Employee participation should begin by creating a high level of awareness on the part of all persons involved, to enable them to understand the philosophy, principles, techniques, and purposes of employee participation. In effect, they need to know what employee participation is, how it works, and how it will benefit

both the company and themselves (Axtell 1981; Reiker 1981; Sagarin 1981). As in orientation to job redesign, workers will want to know why the company is doing something different than before, how this fits into the goals of the company, how the company is demonstrating its commitment to the new practice, and where and what problems might be expected. Orientation should also give workers a chance to hear about the kinds of additional training they will receive, and offer them the opportunity to express and defuse their fears about the new system.

Employee Technical and Scientific Training Needs

In employee participation practices, employee may be given added responsibilities for cost reduction, as well as for other aspects of their jobs for which they are not traditionally responsible. Because of this, workers will find many situations where they will need a higher level of skill and knowledge about the operation and maintenance of the tools and processes they use, as well as a better understanding of the standards related to the efficiency and productivity of their jobs (Fukuda 1981; Simper 1981). Training workers to reduce loss or waste and to recognize potential causes of loss or waste may be especially critical (Simper 1981).

Workers may also need business skills, such as those needed in planning, organizing, problem solving, scheduling, ordering, goal setting, using resources, budgeting, and managing projects. They may need to learn skills in self-supervision, and they should gain an understanding not only of how their jobs are done, but also how their jobs relate to other jobs in the company (Crosby 1981).

Employee participation as a management practice places great attention on training employees to help improve both the quality and quantity of production. Some of the most important training

needs will be in measuring techniques vital to quality and quantity control, such as--

- brainstorming;
- gathering data;
- Pareto analysis;
- cause and effect diagramming;
- central tendency analysis;
- frequency distribution analysis;
- use of histograms, cross tabulation, scattergrams, and other charts and graphs;
- management presentation,
- stratification,
- $\bar{X}$-R control charts.

Problem-solving and decision-making process training may also be needed (Fukuda 1981; Reiker 1981; Wright Patterson 1982), along with training in work simplification and job timing.

Employee Communications Training Needs

According to studies performed by the International Association of Quality Circles (Vaughn and Whelan 1981) and by Wayne Reiker (1981), who is considered to be the father of employee participation groups in America, there is a critical need to develop the effective communications skills of workers involved in employee participation. Training may be needed in interpersonal relationships because of the increased interactions between workers in these situations (Dillard 1982; Simper 1981). Additional or remedial training in language, reading, writing, and oral presentation may also be necessary for some workers (Course Information, QMT #082; Sagarin 1981; Vaughn and Whelan 1981), as well as training in creative thinking and in problem-solving skills.

Employee Group Process Skills Training Needs

A collection of capable people does not always produce an effective employee participation group or team. Training is needed to bring out the best in people cooperating in these efforts (Lippitt 1969; Vaughn and Whelan 1981). Different employees will need varying degrees of training in team building (Francis and Young 1979), and in group dynamics (Reiker 1981), as well as in presenting ideas to other groups at other organizational levels, brainstorming, choosing the right problem to work on, problem solving, resolving conflict, and communicating both verbally and nonverbally (Moore and Moore 1981; Reiker 1981; Vaughn and Whelan 1981). They may also need training in running effective meetings, developing agendas, and in understanding and using the mechanics of meetings (Course Information, QMT 082, 1982).

Supervisors Orientation Training Needs

The success or failure of employee participation may hinge on the ability and enthusiasm of first-line supervisors in implementing the new management technique. Supervisors will therefore need a more comprehensive understanding of the dynamics of the technique than will the workers. Orientation training sessions should be tailored to the needs dictated by supervisors key leadership roles. (See the Employees Participation Training Needs Section for additional training needs in orientation as well as in other areas; supervisors will need to acquire the same knowledge and skills in employee participation as do the workers they supervise, as well as some additional skills needed to help facilitate the participation efforts.)

Supervisor Technical and Scientific Training Needs

Supervisors will also need a detailed background in the theory

and practice of employee participation--that is, they will need to know how these theories are applied to the management of people, and specifically how to perform employee participation interventions. In addition to their traditional supervisory skills, first-line supervisors in these new work situations will need training in how to apply new leadership styles. They will need to know how to (1) train employees in their new responsibilities; (2) counsel employees about both work-related problems and career opportunities within the company; (3) help subordiantes set performance goals; (4) review with employees their performance in attaining the goals; (5) provide increased openness of communications both upward and downward in the organization; (6) develop and test with subordinates the innovations and methods for executing and coordinating the work; (7) work with such aspects of the work context as compensation, control systems, opportunity structures, equipment, and space; and (8) manage the evolution of the employee participation process itself.

First-line supervisors will need a higher level of skills and knowledge in some operations, as well as a thorough understanding of the whole, in order to be helpful to their subordinates. Supervisors will also need skills in sharing their authority with group participation leaders, and will need to know how to recognize, consult with, and be receptive to the leaders of the group (Dowling 1978). Supervisors will have to know how to coach, how to serve as resource persons, and how to reinforce workers (Axtell 1981; Simper 1981).

Supervisor General Communications Training Needs

First-line supervisors will need the same kinds of general

communications skills that workers will need in the new system, but the supervisors may need higher levels of the skills because of the increased responsibility and leadership of their jobs. Still in giving and receiving feedback and reinforcement will be essential, not only for greater interaction with subordinates, but also with the levels above the supervisors.

Supervisor Group Process Skills Training Needs

Supervisors will need higher levels of skill because of their new roles. (See Employee Participation Training Needs for a detailed listing.)

Lower Level Mid-Management Orientation Training Needs

Managers at the lower level are the people to whom first-line supervisors generally report. Like the supervisors, these managers will need specific training in all aspects of employee participation so they can effectively help their first-line supervisors get the new system started, and so they are able to implement the needed changes in their own levels of management.

Lower Level Mid-Management Technical and Scientific Training Needs

Unlike first-line supervisors, most managers at the lower level will not need training in machines, processes, and other operations, or in the kinds of basic supervisory skills the first-line supervisors must have. The lower level managers will need a greater depth of understanding in management principles, however, since employee participation on their own level may give them greater management responsibilities than they had under the traditional management structure. The use of specific training in cause and effect diagrams, and so forth, may not need to be as extensive for the managers as for first-line supervisors, since the managers will not be involved directly in many of the

worker-level decisions and changes made through the employee participation system.

Lower Level Mid-Management General Communications Training Needs

Presumably, persons in lower level mid-management positions will not need training or remediation in basic language skills and the like. Their communications skills needs will be essentially the same as those needed by supervisors.

Lower Level Mid-Management Group Process Skills Training Needs

These managers' needs in this area are essentially the same as those needed by supervisors.

What Must the Schools do to Work Cooperatively with Business and Industry?

In the previous chapter, we examined the interrelationships existing among lagging productivity, the economy, and occupational education. The emerging role of human capital investment in productivity improvement and economic recovery and the new emphasis toward economic revitalization was discussed. The efforts of B/I to improve human productivity and quality of work life through technological developments and fuller utilization of human resources was examined at length. Particular focus was placed on the new management practices being used by industry. The two management practices highlighted were job redesign and employee participation.

This unit assumes that postsecondary occupational education has a role in assisting B/I with the massive retraining job that lies ahead. It examines both generally and specifically what schools need to do to work more closely with B/I in the retraining of working adults for new management practices.

Indeed, B/I will be using management practices to improve

the productivity and QWL of the organization and their workers. The move in that direction could be nothing less than a massive touching of thousands of companies and tens of millions of workers. Japan has between one and two million worker participation groups comprised of over 12 million workers in a country half the size of the U.S. Business Week magazine estimated that 45 million jobs will be touched or affected by the new efforts to improve human productivity and QWL (Bottoms 1981).

Close study of the type of training that job redesign and employee participation requires for employees, supervisors, and lower level mid-management, and consideration of the importance to the nation's economy that returning to a more progressive productivity level has, shows how important the role of the community and technical colleges has become. The question of whether postsecondary occupational education through community and technical colleges should become involved in what might be a massive retraining of America's existing working force seems to answer itself.

The seriousness of reindustrialization or the failure to reindustrialize quickly enough has great social/political, national defense, and economic ramifications. The need for haste in recovery is agreed upon by experts in the fields of economics, sociology, military defense, and politics.

A review of the kinds of training that job redesign and employee participation demand demonstrates that the training needed is well within the capability and traditional mission of postsecondary occupational education. Postsecondary occupational education is the only established, in-place delivery system of occupational training in the public sector, and has the potential for working

cooperatively with B/I to assist in expediting the massive retraining that new management practices could cause. Particularly, the impact of postsecondary occupational education could be strongly felt by a wide range of B/I concerns: those companies a slice below the size of the really giant companies down to the small privately owned business and industry. Companies within this size range rarely have the capacity for the type of massive human resource development that could be needed in years to come.

The major questions then do not center on "should schools become involved" in retraining the adult population for new management practices. They include instead--

1. In general, what must the schools do to work cooperatively with B/I to train/retrain personnel to use the new management practices identified in this study?

2. Specifically, what local level administration and content strategies are needed?

In general, what must the schools do to work cooperatively?

Widespread agreement that closer collaboration is needed between B/I and education is held by educators, B/I, government, professional associations and observers of the U.S. economic scene (Craig 1981; Quie 1981; Carnevale 1981; Wolfbein 1981; Evans 1981; Hopkins 1982; Wilson 1981). Indeed, community and technical colleges represent a key source for assisting B/I with the training needed to implement these new management practices in a quick as possible fashion to improve both productivity/QWL. The realities are that for quicker reindustrialization, B/I will need help with the development of its human resources (Bolino 1981; American Society 1982a).

It is becoming more clear that postsecondary occupational education sees itself with a real future role in training for productivity and quality of work life (Bushnell 1980; Yarrington 1981a). A major goal for 1982 of the American Association of Community and Junior Colleges is in economic development and Quality Life program expansion (President 1981).

Generally, to work cooperatively with B/I in the retraining of the adult work force postsecondary occupational education will need to rethink its strategies (Bottoms 1981). It will need to represent occupational education as something more than training for initial job entry (Hopkins 1982).

According to a poll of the National Telephone Reactors Committee, a committee of experts representing the AACJC, ASTD, and AVA, occupational education decision makers will need not only to be more aware of but also understand the significance and urgency of the situation. Committee members used terms such as "riding a new horse", "using new wine skins," and "on this issue we couldn't be further behind" to express the significance of the change that must develop in our understanding. Occupational education will need to understand its role in economic development, and how human capital investment as a concept speaks to occupational education in terms of its potential impact on the nation's economy through productivity and QWL issues. It will need to more clearly see the vision of what might be in order to become the educational cutting edge for science and invention (Proxmire 1981).

To foster collaboration, schools will need to listen and work with B/I (Parnell 1981), develop formulas to discuss and

work out the implication of emerging needs for retraining (Bottoms 1981), and, develop workshops between such groups as AACJC, ASTD, and AVA. They will have to establish productivity/QWL centers on each campus for knowledge transfer, research, dissemination, and training; assign full-time positions to this effort; call on all companies every year; and perhaps have the college president make at least one call each week (Sorenson 1982). Importantly, schools will need to get a better handle on what B/I wants and what price they are willing to pay (Paulsen 1981). An effort will need to be made to involve legislative people in this effort (National Association 1982), and to convince B/I leaders of the school's ability to understand the needs of B/I and to deliver quality service. The realization is what B/I and education will need to share the responsibility for expanding the skill level of the worker (American Council 1982b).

What Local Level Administrative and Content Strategies are Needed

Administratively, the guidepost for occupational education in the 1980s will be greater program flexibility. To deliver services to B/I that impact upon productivity/QWL community/technical colleges will need to move from their traditional patterns of operation (Bolino 1981). Administrative procedures will need to be developed to ensure that funds can be quickly accessed for program development, that program quality can be controlled, and that accreditation standards are met (Paulsen 1981). In addition, it is important that the "red-tape" of program customizing and designing be reduced, that "fast response" programming be initiated, that technical assistance and support be provided to companies, that more effective and efficient methods of developing and delivering education and training through the use of modern communication

technology be extended, that up-to-date equipment and curriculum development strategies be adopted, and that close liaison with business and industry be maintained (National Association 1982). Furthermore, provisions must be made for the continual updating of community/technical college teaching staff, along with the methods for calculating the return on such human resource investments.

Strategies will need to be implemented to insure the delivery of high quality subject matter content. In assisting B/I in meeting their training needs, schools will need to be open to a multitude of approaches. Community and technical staff will need to be continually updated in their areas of expertise (Hopkins 1982), funds will need to be available for curriculum development, and creative approaches in scheduling instructors for both on and off-campus assignments will be needed. In reviewing the training needed for the implementation and maintenance of both job redesign and employee participation management practices, it becomes apparent that interdisciplinary approaches for the development and delivery of this training will be needed.

Content specialists from areas including mathematics and reading, psychology, business, and supervision may each be needed to participate in the development of the training program to meet a particular company's needs. In addition, staff with expertise in the scientific/technical areas of process, procedures, standards, machine operations/maintanance, and related job content may have a significant role to play in designing and delivering this type of training. Though company to company "customizing" will be necessary, some material for which there appears to be a large market will become generic (Craig 1980).

In developing content, we will need to be more creative

in involving plant staff in curriculum development and, in some instances, in teaching the programs. Utilizing equipment located at the plant may become routine (Hopkins 1982). Instructional staff may need advanced training in how to design customized training programs in and how to teach working adults. Success in customizing curriculum will be the key (Paulsen 1981).

Barriers to Closer Cooperation

There are a number of barriers that will need to be resolved so that B/I and education can cooperate in the massive retraining effort ahead. This section will identify the more pressing barriers. The next unit will suggest ways to overcome these barriers.

As Kristian Paul put it: "B/I doesn't regularly look to postsecondary occupational education for quick start programs aimed at improving productivity/QWL because in the past it has not been a focal point of our mission so we have not established creditability in that area to the extent that we can." However, he points out that there are noteable exceptions throughout the country where very successful interrelationships between B/I and education have been developed (Paul 1981). In repeated interviews with trainers, B/I consultants in productivity/QWL, and with personnel in national/state public/private productivity/QWL centers, it has been pointed out that publicly-supported occupational education has not established itself as a source for training of the employed work force in the area of productivity/QWL. Thomas Miller, vice president of Control Data Corporation, put it this way: "It's hard for B/I to see you as a leader when you don't use the management practices to improve human productivity/QWL and you

lack modern technology." Regularly, persons interviewed felt that those in occupational education lacked the understanding that the concepts of job redesign and employee participation.

Repeatedly, persons both inside and outside of education suggest that major barriers include: the extent to which the schools are already overburden with traditional students and the isolation of the school from the scientific and engineering community (Wolfbein 1981); the lack of time available to deliver training; and the need for the staff to receive additional training (Evans 1981). Also mentioned were the schools' lack of assigned responsibility for training and retraining (Arai), the extent to which program content is out of date (Bottoms 1981); the lack of funding available for such efforts and the penalities on statewide funding formulas for running non-credit short-term training (Paulsen 1981); inflexible curriculum and course hours; the cumbersome bureaucratic procedures; the arrogant attitude of educators as viewed by some B/I persons; and the academic word's difficulty in translating theory into applied knowledge (Lynton 1981). Schools will need to reduce such barriers as lengthy approval processes, inflexible admission and registration procedures, lack of adaptability of time, place, and format, and sometimes inflexible use of facilities (Lynton 1981).

Strategies to Build Partnerships

As mentioned previously, occupational education needs to identify its role in assisting B/I with the training and retraining of the working adult population for improved human productivity and quality of work life. Armed with this understanding and agreement, leaders of occupational education will need to convince congressional leaders of the important role that occupational

education can play in reindustrializations.

According to Donald Clark, president of the National Association for Industrial-Education Cooperation, what is needed is enabling legislation that provides the needed federal funding for research studies; national and state leadership; pilot projects; program development and implementation to launch this new effort; evaluation; and dissemination (Clark 1981). Increasingly, there is a call for a national employment policy that would encourage this type of legislation. To make this call heard, national groups like the AACJC will need to work even harder on making their views on national policy development known.

Locally, major barriers will be reduced when occupational education begins spending time knocking on the doors of B/I. Occupational education will need to leave the classroom and go into the world of B/I to much more clearly understand the problems of lagging productivity, what B/I is doing to improve the situation, and how the schools can help. With little experience in this field, occupational education will need to establish itself through a series of perhaps small initial efforts with B/I, and then expand its services from that point. The lessons learned by some schools in establishing themselves.

Additionally, schools will need to practice what they preach. That is, they will need to adapt the new management practices and technology in their organizations to show B/I just how serious they are. Existing subject matter content will need to be examined to determine the changes that are needed in order to use some of the existing material from traditional programs in B/I (Paulsen 1981). Greater use of industrial people will be needed as key sources for help in developing content for use in industry (Hiegel 1982).

Traditional instructors will need to learn new skills in customizing instructional material. Efforts will need to be made to reduce the cumbersome bureaucratic shuffle associated with program design and development approval procedures, staff scheduling, and assignment, and other administrative procedures that slow down the improvement effort: a slowdown that repells industry, registration procedures, accounting, and policies regarding the use of facilities will need to be reexamined and streamlined where needed.

Present staff members may need retooling to gear up for B/I instruction. Staff members may need upgrading through industry-sponsored training programs, B/I education exchanges, and leaves of absence to work in industry. Greater use of B/I personnel as instructional staff will need to be examined in highly technical areas (Hiegel 1982).

Locally, funding of training in B/I will need to be continually addressed and solved. One answer might be the sharing of short-term training courses between school districts to utilize the programs as effectively as possible. Funding might be available through local, regional, or state economic development councils. Also, the business and industries receiving the training can serve as a source of capital (Paulsen 1981).

Reference List

Arai, Joji. Personal interview. Washington, DC, October 1981.

Auerbach, James. Proceedings from the American Vocational Convention, Atlanta, 5 December 1981.

Axtell, Paul. "Worker Involvement." In Productivity the American Way, edited by Norman Bodek. Stamford, CT: Productivity, 1981.

Bailey, Martin J. National Income and the Price Level. 2d ed. New York: McGraw-Hill, 1971.

"Biomechanics Boosts Worker Productivity." Industry Week 184, no. 5, (February 1975): 34-36.

Bluestone, Irving. "Implementing Quality-of-Worklife Programs." Management Review 66, no. 7, (July 1977): 43-46.

Bodek, Norman. "The Integral Approach to Productivity." In Productivity the American Way, edited by Norman Bodek Stamford, CT: Productivity, 1981.

Bolino, August. Productivity: Vocational Education's Role. Information series no. 223. Columbus: The National Center for Research in Vocational Education, The Ohio State University, January 1981.

Bottoms, Gene. "Collaboration with the World of Work." VocEd 56, no. 7, (October 1981): 12-13.

Bryan, Leslie. "The Japanese and American First-Line Supervisor." Training and Development Journal, (January 1982): 62-68.

Burch, Charles G. "Working Smarter." Fortune 103, no. 12, (1 June 1981): 68-73.

Bushnell, David. The Role of Vocational Education in Economic Development. Arlington, VA: American Vocational Association, 1980.

Carnevale, Anthony. "Human Capital: The Future for Private Training." Training and Development Journal 36, no. 1, (January 1982): 41-48.

Carnevale, Anthony. Memorandum to the National Issues Committee Meeting, 17 July 1981. Washington, DC: American Society for Training and Development, 1981a.

Carnevale, Anthony. The Real Supply Side Economics. Remarks presented before the National Conference on the Role of Vocational Education in Economic Development and Productivity. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981b.

Carnevale, Anthony. Telephone interview, November, 1981c.

Christopher, William. "How Measurement Can Improve Productivity Performance." In Productivity the American Way, edited by Norman Bodek, Stamford, CT: Productivity, 1981.

Clark, Donald. A Post Industrial Perspective on Improving Joint Efforts Between Education and the Employment Community. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Connally, John. "Productivity and National Policy." Dimensions of Productivity Research, vol. II, edited by John Hogan and Anna Craig, Houston, TX: The American Productivity Center, 1980.

Course Information, QMT 082. Course information obtained from Air Force on personal visitation at Wright Patterson Air Force Base, Dayton, Ohio, January, 1982.

Craig, Robert. "Education - Work Relations: A Work Perspective." The Role of Education in the Reindustrialization of the United States. Proceedings of a conference sponsored by the U.S. Department of Education, edited by S.J. Sniegoski. Washington, DC: U.S. Department of Education, March 1980.

Craig, Robert. Interview in Washington, DC, October, 1981.

Crosby, George. "Getting Back to the Basics on Productivity." Administrative Management (November, 1981).

Denison, Edward. Accounting for Slower Economic Growth: The United States in the 1970s. Washington, DC: The Brookings Institute, 1979.

Dillard, Thomas. "Team Development." Remarks from a talk given before the Central Ohio Chapter, American Society of Training and Development, Columbus, OH, 9 February 1982.

Dobb, John. "Robotics: The New Steel Collar Workers." Personnel Journal, September (1981): 688-695.

Dowling, William F., and Sryles, Leonard R. How Managers Motivate: The Imperatives of Supervision. St. Louis: McGraw-Hill, 1978.

Drews, Donald. Utilizing Vocational Education to Improve Productivity. Raleigh, NC: Conserv, Inc., 1981.

Etzioni, Amitai. Reindustrialization and Vocational Education. Occasional paper no. 76. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Evans, Rupert E. Vocational Education and Reindustrialization. Occasional paper no. 75. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Feldman, Marvin. Work, Employment, and the New Economics. Occasional paper no. 70. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Francis, Dave, and Young, Don. Improving Work Groups. LaJolla, CA: University Associates, 1979.

Freund, William C., and Manchester, Paul B. "Productivity and Inflation." In Dimensions of Productivity Research, vol.I, edited by John Hogan and Anna M. Craig. Houston: The American Productivity Center, 1980.

Fukuda, Ryuji. "Quality Control in Japan - The State of the Art." In Productivity the American Way, edited by Norman Bodek. Stamford, CT: Productivity, 1981.

Greider, William. "The Education of David Stockman." The Atlantic Monthly, December (1981) pp. 27-54.

Hackman, Richard, and Oldham, Greg. Work Redesign. Reading, PA: Addison-Wesley Publishing, 1980.

Haggerty, Patrick. "Technology, People, and Productivity." In Dimensions of Productivity Research, Vol. II, edited by John Hogan and Anna Craig. Houston: The American Productivity Center, 1980.

Harman, Sidney. "Worker Productivity: Technology or People." Personnel Journal 58, no. 4 (April 1979): 209-211.

Harris, Lou, and Etzioni, Amitai. Perspectives on Productivity: A Global View. A Sentry Study Series. Stevens Point, WI: Sentry Insurance Company, 1981.

Heaton, Herbert. Productivity in Service Organizations: Organizing for People. New York: McGraw-Hill, 1977.

Hershauer, James, and Ruch, William. "A Worker Productivity Model and its use at Lincoln Electric." Interfaces 8, no. 3, (May 1978): 80-90.

Herzberg, F.; Mausner, B.; and Snyderman, D. The Motivation to Work. New York: Wiley and Sons, 1959.

Hiegel, Charles. Personal interview, General Motors, Dayton, Ohio, January, 1982.

Hodgetts, Richard. Management Theory Process and Practice. Philadelphia, PA: W.B. Saunders Company, 1979.

Hopkins, Charles. "A National Prospective on Vocational Education and its Impact on Research and Leadership Development." A paper presented at The National Center for Research in Vocational Education. Columbus, OH: February 1982.

Ives, Carolyn E. "Secretarial and Clerical Training." In Training and Development Handbook, edited by Robert Craig. New York: McGraw-Hill, 1976.

Jacobs, Bruce A. "Can Electronics Perk Up Office Productivity." Industry Week 206, no. 1 (7 July 1980a): 50-57.

Jacobs, Bruce A. "Wellness Goal - Trim Workers and Costs." Industry Week 206, no. 1 (7 July 1980b): 90-92.

Jamieson, Dave. "Dialogue with Gordon L. Lippitt." Training and Development Journal, (January 1982): 19-30.

"Japan Takes Over in High Speed Fax." Business Week 2, November (1981), pp. 104-108.

Jorgenson, Dale. "U.S. Productivity Growth: Retrospect and Prospect." In Dimensions of Productivity Research , vol. I, edited by John Hogan and Anna Craig. Houston: The American Productivity Center, 1980.

Katzell, Raymond A., and Yankelovich, Daniel. Work, Productivity, and Job Satisfaction. New York: The Psychological Corporation, 1975.

Kelly, James. Time (8 February 1982).

Kirby, Peter G. "Productivity Increases Through Feedback Systems." Personnel Journal 56, no. 10, (October 1977): 512-515.

Kirkland, Lane. "Productivity: A Labor View." In Dimensions of Productivity Research, vol. II, edited by John Hogan and Anna Craig. Houston: The American Productivity Center, 1980.

Kutscher, Ronald; Mark, Jerome; and Norsworthy, John. "The Productivity Slowdown and the Outlook for 1985." Monthly Labor Review, (May 1977): 3-8.

Landen, Delmar. "Developing a Quality of Work Life Program That Works For All." Productivity the American Way, edited by Norman Bodek. Stamford, CT: Productivity, 1981.

Levitan, Sar. Conversation at the National Center for Research in Vocational Education. Columbus, OH: Fall 1981.

Lippitt, Gordon L. Organization Renewal. New York: Appleton-Century-Crofts, 1969.

Lynton, Ernest A. The Educator's Outlook on Workforce Development. Paper from conference, Education and Work Relations for the 1980s. Washington, DC: American Society for Training and Development and the American Council on Education, 1981.

Main, Jeremy. "Westinghouse's Cultural Revolution." Fortune 103, no. 12, (15 June 1981): 74-93.

Mali, Paul. Improving Total Productivity. New York: John Wiley & Sons, 1978.

McGregor, Douglas. Human Side of Enterprise. New York: McGraw-Hill, 1960.

McKee, Keith E. "Defense and Productivity." Manufacturing Productivity Frontiers (February 1981): 1-2

Meyer, Warren G. Vocational Education and the Nation's Economy. Seventh Yearbook of the American Vocational Association. Arlington, VA: American Vocational Association, 1977.

Miller, Thomas. The Business and Industry Perspective on U.S. Productivity: Implications for Vocational Education. Proceedings from an address delivered at the National Center for Research in Vocational Education. Columbus, OH, 12 January 1982.

Moore, Brian, and Ross, Timothy. The Scanlon Way to Improve Productivity: A Practical Guide. New York: Wiley and Sons, 1978.

Moore, Christine, and Moore, Leo. "Productivity and Organizational Management." In Productivity Analysis: A Range of Perspectives, edited by Ali Dagramaci. Boston: Martinus Nijhoff Publishing, 1981.

Morse, Borg Warner. Telephone interview, January, 1982.

"Moving Beyond Assembly Lines." Business Week no. 2698, (27 July 1981): 87-90.

National Academy of Sciences. Measurement and Interpretation of Productivity. Washington, DC: National Academy of Sciences, 1979.

National Association of State Directors of Vocational Education. Position Statement of National Association of State Directors of Vocational Education: The Role and Responsibility of Vocational Education in Economic Development and Productivity. Arlington, VA: National Association of State Directors of Vocational Education, 1982.

"New Industrial Relations." Business Week, May 1981.

Noll, Ronald, and Oberwise, Robert. "U.S. Production: An Affective Approach to Worker Motivation." Training and Development Journal 36, no. 1 (January 1982): 57-60.

Ouchi, William. Theory Z: How American Business Can Meet the Japanese Challenge. Reading, PA: Addison-Wesley Publishing Company, 1981.

Parnell, Dale. Personal interview, American Association of Community and Junior Colleges, January 1982.

Parrott, Raymond C. "Human Resource Management: A Federal Overview." Proceedings of a conference sponsored by the Community-Based Organizations, University of California at Los Angeles, September 1981.

Parsons, McIlvania H. "What Caused the Hawthorne Effect?" Administration and Society 10, no. 3 (November 1978): 258-283.

Pascale, Richard T., and Althos, Anthony. The Art of Japanese Management. New York: Simon and Schuster, 1981.

Patten, Thomas, and Vaill, Peter. "Organization Development." In Training and Development Handbook, edited by Robert Craig. New York: McGraw-Hill, 1976.

Paul, Krishan. Personal interview, January 1982.

Paulsen, Russell. Short Term Skill Training. Information Analysis series no. 222. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Peterson, Richard, and Duffany, Bruce. "Job Enrichment and Job Redesign." In Training and Development Handbook, edited by Robert Craig. New York: McGraw-Hill, 1976.

"President Dale Parnell: An Interview." Community and Junior College Journal, September, 1981.

Proxmire, William. Personal interview, Wisconsin, October, 1981.

Quie, Albert. "Vocational Education Policies from a State Perspective." Remarks delivered before the National Center for Research in Vocational Education staff. Columbus: The National Center for Research in Vocational Education, The Ohio State University, October 1981.

Reiker, Wayne S. "QC - Advanced Techniques." In Productivity the American Way, edited by Norman Bodek. Stamford, CT: Productivity, 1981.

Rosow, Jerome M. "People and the Productivity Equation." Journal of Contemporary Business 8, no. 4, 1979, pp. 27-32.

Rosow, Jerome. The Worker and the Job. Englewood Cliffs, NJ: Prentice-Hall, 1974.

Rush, Harold. "The Behavioral Sciences in Training and Development" Training and Development Handbook, edited by Robert Craig. New York: McGraw-Hill, 1976.

Russell, George. "Now the Star Wars Factory." Time 118, no. 18, (2 November 1981): 74-81.

Sagarin, Barbara. The History, Structures, and Operation of Quality Circles. Scottsdale, AZ: Rozelle, Stokes, and Associates, 1981.

Sibson, Robert. Incresing Employee Productivity. New York: AMACON, 1976.

Simper, Kenneth, "Resources Management - A Successful American Strategy for Involving Supervisors and Employees in Productivity Improvement." In Productivity the American Way, edited by Norman Bodek. Stamford, CT: Productivity, 1981.

Sorenson, Robert. Personal interview, February 1982.

Striner, Herbert E. The Reindustrialization of the United States: Implications for Vocational Education Research and Development. Occasional paper no. 71. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Taylor, Daniel B. Revitalizing the American Economy: A Research and Development Focus for the 1980s. Occasional paper no. 64. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

"The Speedup in Automation." Business Week, (3 August 1981): 58-67.

Thurow, Lester, Investment in Human Capital. Belmont: Wadsworth Publishing, 1970.

Varney, Glenn H. "Productivity in the 80s - Are You Ready? Training and Development Journal, (March 1981): 13-18.

Vaughn, Robert, and Whelan, Susan. "The Spreading of Quality Circles." The Quality Circles Journal 4, no. 2 (May 1981): 27-28.

Waldman, Alan. "The Apostle of Productivity." Mainliner (May 1980): 111-114.

Wilson, Richard. "Collaboration with the Private Sector - A Necessity." Community and Junior College Journal 52, no.9 (September 1981): 2-4.

Wolfbein, Seymour. Vocational Education and the National Defense. Unpublished paper. Columbus: The National Center for Research in Vocational Education, The Ohio State University, 1981.

Woolard, Andrea. "The Human Factor Plays Growing Role in Product Design." The Aviation Science Monitor, (1 September 1981): 10

Wright Patterson Air Force Base. Personal interview with Air Logistics Command Productivity Center personnel and Air Force Technical Institute personnel, January 1982.

Yankelovich, Daniel. "Yankelovich on Today's Workers." Industry Week, August 1979.

Yarrington, Roger. "George B. Vaughn: Questioning the Community College." Change 13, no. 5 (August 1981): 34-35.

Yarrington, Roger. Interview, October 1981.

RESOURCE LIST

Resource persons utilized in developing this paper are listed below with appreciation for their assistance.

Personal Interviews and Visitations

Dr. Arch Alexander
Deputy Director
State Department of Vocational Education
Stillwater, OK

Mr. James Auerback
Representative
Department of Education
AFL/CIO
Washington, D.C.

Ms. Jacqueline Cody
Training Chief
Tinker Air Force Base
Oklahoma City, OK

Dr. Dorothy Fenwick
Project Director
American Council on Education
Washington, D.C.

Ms. Peggy Gordon, Manager
Productivity Center, Logistics Command
Wright Patterson Air Force Base
Dayton, OH

Major Russell Lloyd
Air Force Institute of Technology
Wright Patterson Air Force Base
Dayton, OH

Mr. Paul Moniner
Plant Manager
National Can Company
Oklahoma City, OK

Congressman Thomas Petri
U.S. Representative, Wisconsin
Washington, D.C.

Mr. Joji Arai, Manager
Japan Productivity Center
Washington, D.C.

Dr. Maurice Buckner
Dean, Continuing Education
Brevard Community College
Cocoa, FL

Frank Darling
Rockwell International
Columbus, OH

Ms. Margery Finnin
Aide to U.S. Representative Petri
Washington, D.C.

Mr. Thomas Hiegel
Supervisor, Education and Training
General Motors Corporation
Dayton, OH

Dr. Otto Lockee
Vice-President, Continuting Education
Piedmont Community College
Charlotte, NC

Dr. Raymond Parrott
Executive Secretary
National Advisory Council on Vocational Education
Washington, D.C.

Senator William Proxmire
U.S. Senator, Wisconsin
Washington, D.C.

Personal Interviews and Visitations Continued

Ms. Barbara Pruwitt
Management Development
Maintenance Logistics
Command
Wright Patterson Air
Force Base
Dayton, OH

Mr. Earle Rochester
Industrial Services
Tri-County Technical College
Pendleton, SC

Mr. Michael Usdan
President
Institute for Educational
Leadership
Washington, D.C.

Dr. Robert Worthington
Assistant Secretary for Vocational
and Adult Education
U.S. Department of Education
Washington, D.C.

Dr. Roger Yarrington
Vice President
American Association for
Community and Junior
Colleges
Washington, D.C.

Telephone Interviews

Mr. Anthony Carnevale
Consulting Economist
American Society for
Training and Development
Washington, D.C.

Dr. Edward Denison
Associate Director
Bureau of Economic Analysis
U.S. Department of Commerce
Washington, D.C.

Dr. Keith E. McKee,
Director
Manufacturing Productivity
Center
Illinois Institute of
Technology

Mr. Ted Mills, Director
American Center for the Quality
of Work Life
Washington, D.C.

Dr. James Taylor, Research Fellow
Center for Quality of
Working Life
University of California
Los Angeles, CA

Conferences Attended

"National Conference
on Fostering Economic
Development and Productivity
Through an Investment in
Human Resource Development"
May 24-26, 1982
Columbus, OH

"Opportunity with Excellence"
American Association of Community
and Junior Colleges
April 4-7, 1982
St. Louis, MO

Conferences Attended Continued

"Productivity the American Way
November 2-4, 1981
New York, NY

"The Social Impact of Advanced Technology"
International Symposium
May 10-14, 1982
Columbus, OH

"Shaping the Future Through Human Productivity"
American Society for Training and Development
National Conference
May 16-20, 1982
San Antonio, TX

NATIONAL COMMITTEE

American Association of Community and Junior Colleges, Richard Wilson

Richard Wilson
V.P. for Governmental Relations
American Association of Community
and Junior Colleges
Suite 410
One Dupont Cirlce, N.W.
Washington, D.C. 20036

James Mahoney
Project Director,
Energy Communications Center
American Association of Community
and Junior Colleges
Suite 410
One Dupont Circle, N.W.
Washington, D.C. 20036

Barbara E. Macht
Coordinator of Off-Campus
Programs
Hagerstown Junior College
751 Robinwood Drive
Hagerstown, MD 21740

Michael Parsons
Dean of Instruction
Hagerstown Junior College
751 Robinwood Drive
Hagerstown, MD 21740

American Society for Training and Development, Robert Craig

Robert Craig
Director of Government and
Public Affairs
American Society for Training
and Development
Suite 305
600 Maryland Ave. S.W.
Washington, D.C. 20024

Michael Dymmel
Assistant Director of National
Training Fund
Communications Workers of America
1925 K Street, N.W.
Washington, D.C. 20006

Ralph Christiansen
Manager of Organization Development
Martin Marietta Corporation
6801 Rockledge Drive
Bethesda, MD 20034

Forrest Gale
Deputy Director of Productivity
Management Office
Headquarters
Chief of Naval Materials
Room 606
Crystal Plaza #5
Washington, D.C. 20360

American Vocational Association, Gene Bottoms

Gene Bottoms
Executive Director
American Vocational Association
2020 North 14th Street
Arlington, VA 22201

Krishan Paul
Director of Economic Project
American Vocational Association
2020 North 14th Street
Arlington, VA 22201

John Bonfadini
Associate Professor Education
George Mason University
4400 University Drive
Fairfax, VA 22030

Joseph Horowitz
Chairman, Engineering Technologies
Northern Virginia Community College
8333 Little River Turnpike
Annandale, VA 22003

National Center for Research in Vocational Education

Kenneth Huddleston
National Fellow, Advanced Study Center
National Center for Research in Vocational Education
The Ohio State University
Columbus, OH 43210

Arthur Lee
Liaison
National Center for Research in Vocational Education
The Ohio State University
Columbus, OH 43210

NATIONAL TELEPHONE REACTORS

American Association of Community and Junior Colleges, Richard Wilson

Donald Garrison, President
Tri-County Technical College
Highway 76, Box 86
Pendleton, South Carolina 29670

Andrew Korim
Dean of Grants
Community College of Allegheny County
610 Smithfield Street
Pittsburgh, Pennsylvania 15222

Donald Smith
Executive Director
Dawson Skill Center
3901 S. State Street
Chicago, Illinois 60609

Robert Sorenson, State Director
State Board of VTAE
Hill Farms State Office Building
Seventh Floor
4802 Sheboygan Avenue
Madison, Wisconsin 53702

American Society for Training and Development, Robert Craig

Richard Ault
Richard Ault Associates
33 North Autumnwood Way
The Woodlands, Texas 77024

George Kuper
Production Resource Staff
General Electric Corporation
Easton Turnpike
Fairfield, Connecticut 06431

William Lerch
Pennsylvania Power & Light Co.
Two North Ninth Street
Allentown, Pennsylvania 18101

Kenneth Rifkin
A.T.&T.
1776 on the Green
Room 10B28
Morristown, New Jersey 07960

American Vocational Association, Gene Bottoms

Charles Dygert
Director, Economic Development
State Department of Vocational Education
Ohio Department Building
65 South Front Street
Columbus, Ohio 43215

George Mehallis
Director, Technical Education
Broward College
225 E. Las Olas Blvd.
Fort Lauderdale, Florida 33301

Francis Tuttle
State Director
State Department of Vocational and
Technical Education
1515 West Sixth Avenue
Stillwater, Oklahoma 74074

Charles Whitehead, President
State Technical Institute
5983 Macon Cove
Memphis, Tennessee 38134